Bayesian Biostatistics
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Errata

Note that errata with * are in first and second print of book, all other errata have been corrected in reprint of book.

Chapter 2

- **Section 2.7, page 33, line 9**: Add after ‘Gaussian density’: ‘in the notation defined below equation (2.8):’

- **Section 2.9, page 40, expression (2.26)**: this is no error, but it is better to replace $\left(\frac{d\psi}{d\theta}\right)^{-1}$ by $\left(\frac{d\psi}{dh}\right)$

- **Section 2.9, page 40, Example II.4**: Add after $\psi = \log(\theta)$ ‘when starting from equation (2.6)’. Further the reference to Figure 3.3 should be Figure 3.2!

Chapter 3

- **Section 3.3.2, page 50, starting middle of the page**: The reference to a classical confidence and a credible interval is ambiguous. The following changes should be implemented:
  - Original sentence: ‘For a unimodal symmetric posterior distribution, the equal tail credible interval equals the corresponding HPD interval.’ Replace herein ‘credible interval’ by ‘CI’.
  - Paragraph below bullet points should be changed into:
    A 95% CI has a natural interpretation not shared by the classical confidence interval in frequentist statistics. In fact, a 95% CI contains the 95% most plausible parameter values a posteriori while the 95% confidence interval does or does not contain the true value for a particular data set $y$. In the frequentist paradigm, the adjective 95% gets its meaning only in the long run. Having said this, in practice the confidence interval is often interpreted in a Bayesian manner, especially by clinicians. Historically, the CI and confidence interval were developed in about the same period. Already in 1812 Laplace derived that the large sample CI and confidence interval for the binomial parameter coincide.

- **Example III.4, last line, page 50**: Replace ‘95% CI’ by ‘confidence interval’. Also in next sentence on next page!

- **Section 3.4.2, page 53, just below expression (3.10)**: Replace ‘…. by using a property that often holds in practice and is called’ by ‘because we assumed at the start’.

- **Section 3.4.3.1, page 55, last sentence example III.6**: Replace ‘…. of course its interpretation is different’ by ‘takes care of the uncertainty of the true parameter value in a different way’.

- **Section 3.4.3.3, page 57, line -7**: Insert ‘positive’ in front of ‘real value’.

- **Figure 3.4, caption**: Add: ‘The Binomial is represented by the thin line, while the beta-binomial by the bold line.’

- **Figures 3.6, page 62**: figure should be changed (new figure enclose).

- **Example III.10, heading, page 63**: remove parentheses around dmft-index.
Section 3.7.2.2, page 67, (a) The inverse CDF method: replace by `The inverse cumulative distribution function (ICDF) method'.

Section 3.7.2.2, page 67, line -2: Change RHS into \( \int_{-\infty}^{0} P(\hat{\theta} \text{ is accepted}|\hat{\theta}) P(\hat{\theta}) d\hat{\theta} \)

Chapter 4
None

Chapter 5

Table 5.2, page 107*: Replace `mu' by `sigma^2' for Normal-mean fixed case.

Section 5.3.1, page 109, Example V.2*: Replace `N(328 100)' by `N(328, 100)' and `t_{30}(128 100)' by `t_{30}(328, 100)'.

Section 5.6.1, page 130, line 2: In N-Inv gamma expression there is one ')' too much at the end, please remove this. In addition, remove the adjective `complex'.

Section 5.6.2.2, page 132, expression (5.37)*: In RHS of expression, there is twice a right parenthesis too much, please remove these.

Section 5.6.2.2, page 132, line -3: Change `the posterior density of \(00,,a\beta\phi y\)' into: `the posterior density \(00,,a\beta\phi p y\)'.

Section 5.7, page 134: Insert before sentence “This implies shrinkage ....” We also assume that the covariates are centered and that X does not contain the constant column 1. In addition, change the sentence “Note that the centered...” into “Note that the response and the covariates are centered such that the intercept is not taking part in the shrinkage process.”

Section 5.7, page 134: Remove sentence “Note that the R function ...” This sentence is completely misplaced.

Section 5.7, page 134, line -10: Replace “(5.30)” with “(5.31)”.

Exercises Chapter 5, page 137, Exercise 5.3: Replace `t(\nu)-prior' by `t_{\nu}-prior'.

Chapter 6

Example VI.3, page 144, last sentence text: replace (2.13) by (2.12).

Example VI.4*, page 147: In the original analysis (and all other analyses published in the literature on this example) b_1 and b_2 are given inverse-gamma priors. In that case the respective conditionals are also inverse gamma. This analysis will be provided in the edition of the book.

Example VI.4*, page 148, full conditional of \(\lambda\): Replace “n-k” in summation by “n”.

Example VI.5, page 149, Sentence `In Table 6.1': add to the end of the sentence (for clarification): `by sampling first from distribution (4.29) and then from distribution (4.27)'.

Section 6.2.4, page 152, line 5: reference `Section III.12' should be replaced by `Section 3.7.2.2'

Section 6.3, page 155, line -3: reference `Section III.12' should be replaced by `Section 3.7.2.2'

Example VI.9, page 166, line -3: reference `Section III.12' should be replaced by `Section 3.7.2.2'

Example VI.9, page 167, last sentence text before Table 6.2: replace `... and WinBUGS the highest’ by `... and WinBUGS together with the self-written program in R the highest’.
• Example VI.9, page 167, Table 6.2: table should be replaced by:

<table>
<thead>
<tr>
<th>Program</th>
<th>Parameter</th>
<th>Mode</th>
<th>Mean</th>
<th>SD</th>
<th>Median</th>
<th>MCSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MLE</td>
<td>Intercept</td>
<td>-0.5900</td>
<td>0.2800</td>
<td>0.1810</td>
<td>0.0017</td>
<td>0.0086</td>
</tr>
<tr>
<td></td>
<td>gender</td>
<td>-0.0379</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>x-coord</td>
<td>0.0052</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>Intercept</td>
<td>-0.5662</td>
<td>0.2809</td>
<td>-0.0481</td>
<td>0.0052</td>
<td>0.0061</td>
</tr>
<tr>
<td></td>
<td>gender</td>
<td>-0.0587</td>
<td>0.1856</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>x-coord</td>
<td>0.0051</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WinBUGS</td>
<td>Intercept</td>
<td>-0.5930</td>
<td>0.2869</td>
<td>-0.0318</td>
<td>0.0053</td>
<td>0.0107</td>
</tr>
<tr>
<td></td>
<td>gender</td>
<td>-0.0322</td>
<td>0.1788</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>x-coord</td>
<td>0.0052</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAS</td>
<td>Intercept</td>
<td>-0.6513</td>
<td>0.2600</td>
<td>-0.6452</td>
<td>0.0317</td>
<td>0.0317</td>
</tr>
<tr>
<td></td>
<td>gender</td>
<td>-0.0319</td>
<td>0.1954</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>x-coord</td>
<td>0.0055</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

• Example VI.10:
  o page 170, first sentence last paragraph: Remove `=22.43' and also `11.69'
  o page 171, paragraph `For the RJMCMC...': Replace `Four combinations ...' by `In total six
    combinations ...', `twice as much' by `half as much' and `For each of the four scenarios ...'
    by `For each of the six scenarios ...
  o page 171, sentence -3: Replace `...for the first scenarios...' by `of one of the scenarios'
  o Figure 6.16: new figure is included

Chapter 7
• Example VII.8, page 199: Insert behind `An R program': “i.e. `chapter 7 interval censoring.R’ ”

Chapter 8
• Section 8.1.1, page 204, paragraph 2, line 4: Remove `...in spatial modeling with ...
• Section 8.1.6, page 212, line -2: Replace second programming command by `p <-
  exp(x)/(1+exp(x))’
• Section 8.1.7, page 213, unnumbered equation: Replace current expression by:
  \[ p(v|V\setminus v) = p(v|\text{parents}[v]) \prod_{w:\text{children}[v]} p(w|\text{parents}[w]) \]

Chapter 9
• Section 9.3, page 234, line 2: Put within parentheses behind first sentence: `(Note that Full
  Bayesian is also referred to in the Bayesian literature when Bayesian inference is based on a
  utility function, in other words when decision theory is involved).’
• Section 9.3, page 238, expression (9.6)*: Replace \[ p(\hat{\theta}|\alpha, \beta) \] by \[ p(\hat{\theta}|\alpha, \beta, y) \]
• Section 9.3, page 239, line 9: Delete `especially’ because it is not needed!
• Section 9.5.7, page 258, line 10: Replace `... are estimated from the data’ by `are fixed to a value
  obtained from the data’
• Section 9.6, line 7*: In sentence `Hobert and Casella (1996) ...’ insert `with’ in front of `a flat
  prior ...
• Example IX.21, page 263: For the (a) bullet, add at the end of sentence `Both an uncentered and
  a hierarchical ...’: “ using the WinBUGS program `chapter 9 dietary study chol hierarchical
  centering.odc” . For the (b) bullet, add behind `Vines et al. (1996)’: “using the WinBUGS program
  `chapter 9 dietary study chol sweeping.odc’ “.

Chapter 10
Example X.3, page 273:

- Replace
  \[
  \sum_i \log [ CPO (M_i)] = -2.64, \sum_i \log [ CPO (M_2)] = -2.81, \sum_i \log [ CPO (M_3)] = -1.07
  \]
  by
  \[
  \sum_i \log [ CPO (M_1)] = -12.241, \sum_i \log [ CPO (M_2)] = -11.468, \sum_i \log [ CPO (M_3)] = -8575
  \]
  Replace also: `therefore PSBF_{12}=1.19, PSBF_{13}=0.51, PSBF_{23}=0.43` by `therefore \log(PSBF_{12})=772, \log(PSBF_{13})=-2893, \log(PSBF_{23})=-3665`.

Example X.5, page 277, line 8: n+2 should be replaced by n+3.

Section 10.2.2.2, page 278, line -1: Replace \( \hat{D}(\hat{\theta}) \) by \( D(\hat{\theta}) \).

Section 10.2.2.2, page 279, line 5*: replace `(and) pitfalls' by `(and pitfalls)'.

Example X.9, page 282: Write before `All models ..': “The programs can be found in `chapter 10 Potthoff-Roy growthcurves.odc'”.

Example X.10, page 283: Replace `chapter 9 dietary study chol DIC.odc' by `chapter 10 dietary study chol DIC.odc'.

Example X.11, page 284: Add at the end of the example (behind `(Exercise 10.10')': “See WinBUGS program `chapter 10 genetic linkage.odc' for all above analyses.”

Section 10.2.2.3, page 286: replace the sentence`Finally, note that R2WinBUGS reports a different value for DIC than WinBUGS; see the vignette of R2WinBUGS for further details and Example X.2 for a comparison with the DIC as reported by WinBUGS.’

By:

`Finally, note that up to 26 July 2006, R2WinBUGS reported a different value for DIC than WinBUGS.’

Example X.12, page 288: Remove last sentence, thus sentence: ‘We also used WinBUGS ...’

Example X.12, page 288: The data file `ostepmultxt.txt' was corrupt. We therefore replaced it by another data file with the same name but without the variables creat and dbp. Replace the current description of the example into:

In ‘chapter 10 osteo multiple regression.R’ we regressed tbmnc on various regressors. The full model consists now of regressors age, bmi, weight, length, caint (calcium intake), menost (number of years since start of menopause) and igfi (IGF-1 which is a hormone similar in molecular structure to insulin). Using R2WinBUGS we fitted four models, model \( M_1 \): all regressors were included, model \( M_2 \): length and weight were removed, model \( M_3 \): age, caint and menost were removed and model \( M_4 \): only bmi was included. For each of the models we recorded DIC, \( p_d \) and MSPE. Each time we ran a single chain analysis of 15,000 iterations and removed the first 7,500 iterations. The following results were obtained for the four respective models: DIC (-12.800, 36.491, 31.785, 58.218), \( p_d \) (10.02, 8.07, 5.06, 3.03) and MSPE (20.0, 26.34, 26.10, 30.40). According to DIC, model \( M_3 \) is best. Note that model \( M_1 \) is best according to MSPE, but there is no clear preference between models \( M_2 \) and \( M_3 \). This result illustrates that with MSPE there is (less) penalty for model complexity. Both measures though agree that the model with only bmi is worst.
Section 10.3.1, line 2, page 288: Replace 'guarantees' by 'guarantee'.
Section 10.3.2.2, line 3: A subindex (i) was forgotten in the expression of the standardized residual, thus the formula should read \( t_i' = \frac{y_i - E(y_i | \mathbf{y}_{(i)})}{\sqrt{\text{var}(y_i | \mathbf{y}_{(i)})}} \).
Section 10.3.2.2, page 293, line 10: Replace `... will be small …' by `... will be large ...'.
Section 10.3.3, page 296, first unnumbered equation: next to proportionality sign it should read as \( \prod_{i=1}^{n} p_i(y_i | \theta, x) p_0(\theta) \).
Section 10.3.3, page 296, equations (10.23a) (10.23b): Equation (10.23b) should be removed and equation (10.23a) should be (10.23).
Section 10.3.3, page 297, first unnumbered equation: The LHS of the equation the numerator and denominator have been switched and thus should read as \( \frac{p(\theta | y_{(i)})}{p(\theta | y)} \).
Section 10.3.3, page 297, expression \( w_i^k \): The expression should read as: \( w_i^k = \sum_{j=1}^{n} w_{ij} \).
Example X.19, page 304, line 10: Replace \( \hat{r}_i = (y_i - \hat{\gamma}_i) / \sigma \) by \( \tilde{r}_i = (y_i - \tilde{\gamma}_i) / \tilde{\sigma} \).
Example X.19, page 304, last line: Replace sentence ‘However,…’ by ‘The procedures did indicate significant deviation from normality in the sense that the residuals have a leptokurtic distribution.’
Section 10.3.4, page 306, lines 2 and 3: Reverse \( D(\tilde{\theta}, \tilde{\phi}) \) with \( D(\tilde{\theta}, \tilde{\phi}) \).
Example X.24, page 310: Add behind “We applied … with WinBUGS (and OpenBUGS)” : “program ‘chapter 10 dietary study chol Box-Cox.odc’.”
Section 10.3.5.4, page 311, line 9: replace `Expression (10.35) ..’ by ‘When in \$m(x; \\backslash vbeta, \\backslash vb)\$ the term \$x-kappa_k\$d_+ is replaced by \$mid x-kappa_k \mid d\$S, expression (10.35) is called the \emph{low-rank thin-plate spline representation of m(x)}. It is argued that this representation has better computational properties.’
Example X.25, page 312, line 4: replace \$x-kappa_k\$d_+ by \$mid x-kappa_k \mid d\$S
Example X.27, 2nd paragraph, line 6, page 315: Replace ‘significantly’ by ‘significant’.

Chapter 11
Section 11.2.2, page 323, line 8: Insert before BIC: ‘minimizes’.
Example XI.2, page 323: Add behind procedure GLMSELECT: “(see SAS program ‘chapter 11 CVS diabetes study.sas’)”
Section 11.4.1, page 327, line before (11.9): Replace ‘decimal’ number by ‘sequential’ number.
Example XI.3, page 328, notation sx: The two symbols ‘s’ and ‘number’ should be put in italics mode.
Example XI.3, page 328, line 6: Replace ‘(part of the)’ by ‘(part of)’.
Example XI.3, Figure 11.3, page 329: Figure (b) is not the correct one. The correct one is:
• **Example XI.3, line 2, page 329**: Insert behind ‘... and is...’; ‘therefore not’.

• **Section 11.4.2, expression (11.14), page 331**: Change strict inequality sign into inequality sign.

• **Section 11.4.2, page 331, middle of page**: Change sentence ‘$O_1 < 1$ and small, then $M_1$ is rejected’ ‘$O_1 < 1$ and small, then $M_1$ is rejected’.

• **Example XI.6, page 336**: The sentence ‘The five best models with prior (11.10) are given in Table 11.3’ should be replaced by:

> ‘The model posterior probabilities obtained with the package glmBfp of the five best models selected in Example XI.4 are shown in Table 11.3 in the column headed by G. Note that these models are not the five best models selected glmBfp, but are rather in the set of ten best models. The MAP includes accp, esr, dc, sym, sje and bcphand is equal to the MP model.’

• **Example XI.6, page 336**: the sentence ‘Compared with the other BVS algorithms, the posterior model probabilities are less outspoken with the hyper g-prior but nevertheless the algorithm gave the same five best models irrespective of whether a stochastic or an exhaustive search was done’ should be replaced by:

> ‘Compared with the other BVS algorithms, the posterior model probabilities obtained with the package glmBfp are less outspoken and resulted in not exactly the same ten best models. However, whether a stochastic or an exhaustive search was done did not matter in our case, but this result depends on the size of the Markov chain.’

• **Example XI.6, page 336, last line**: replace about ‘20 times’ with ‘25 times’.

• **Example XI.9, page 348, caption Figure 11.11**: insert after ‘Diabetes study:’ box plot of MCMC estimates of the regression coefficients together with ....

• **Example XI.9, page 348**: the sentence ‘In Figure 11.11, the ridge, LASSO (posterior median and mode), ...’ should be replaced by:

> ‘In Figure 11.11, the ridge, LASSO (posterior median and mode), ...’

• **Example XI.9, page 348**: the sentence ‘In addition, we have implemented Bayesian LASSO in WinBUGS (‘chapter 11 Blasso diabetes.odc’).’ should be replaced by:
In addition, we have implemented Bayesian LASSO in WinBUGS (chapter 11 Blasso diabetes.odc) with compatible settings for the prior distributions.

- **Example XI.9, page 348**: the sentence 'The posterior median of $\lambda^2$ is 0.081 with 95% CI=[0.052, 0.11]' should be replaced by:
  
  'The posterior median of $\lambda^2$ is 0.080 with 95% CI=[0.021, 0.25].'

- **Example XI.12, page 356**: The sentences 'However, of the first 50 most plausible models a posteriori only five models indicate some nonlinearity. Namely, there is some (minor) evidence for $dc^2log(dc)$ and esr$^2$.' should be replaced by:

  'However, from the first 50 most plausible models a posteriori there is not much evidence for fractional polynomials in the covariates.'

**Chapter 12**

**Table 12.2**: $r$ replace with $r_i$

Page 370: reference incorrect: should be O'Hagan and Leonard, 1976

Also incorrect on page 501

**Chapter 13**

none

**Chapter 14**

Page 395: $t[i]$~dist()($\cdot,\cdot$)

**Chapter 15**

Page 411 line +10 delete ‘That is why’ capitalize ‘We’

Page 412 line-5 `R` should be replaced by $R_i$

Page 419 l-1 should be $Gamma(\alpha,f(t),\beta)$

**Chapter 16**

Page 447 Figure 16.12 caption should read ‘fMRI BOLD image: Finger-tapping experiment.’

**Chapter 17**

None

**Appendix**

**Page 467**: Add for mean $\alpha > 1$ and add for variance $\alpha > 2$

**Page 468**: Laplace density should have ‘abs’: $\text{ie } p(\theta) = \frac{1}{2\sigma}e^{-|\theta - \mu|/\sigma}$

**Page 474**: R command should be: `dchisq(nu*s^2/theta,nu)*nu*s^2/theta^2`