Pattern Recognition and Machine Learning
Errata and Additional Comments

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Preface

This document lists corrections and clarifications for the third printing[1] of *Pattern Recognition and Machine Learning* by Christopher M. Bishop, published by Springer in 2006. It is intended to be complete, in that it includes also trivial typographical errors and provides clarifications that some readers may find helpful. However, it is not assumed to include all mistakes that exist in the book and the author welcomes reports of any remaining potential mistakes, along with any other feedback on the book, which should be sent to

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Corrections and clarifications are given in the order they should appear in the book. Each entry starts with a page number in the margin, followed (in the main body of the page) by the location of the mistake or ambiguity and the required amendment. In specifying the location, the following conventions are used:

- Paragraphs are numbered from 1 on each page. The first paragraph is usually the one continuing from the previous page, but if the first line on a page starts a new paragraph, this will be the first paragraph. In the book, the first line of each paragraph is indented, with the exception of paragraphs that follow immediately after a chapter or a section (but not a sub-section) heading, which are not indented.

- Line and paragraph numbers preceded by a minus (–) sign are counted from the bottom of the paragraph or page. 'Paragraph –1' referes to the last paragraph started, but not necessarily completed on a page.

[1] To identify which printing your copy of the book is from, consult the page with bibliographic information (immediately preceding the dedication page); if the one but last line reads "9 8 7 6 5 4 3 2 1" you have a copy from the first printing, if it reads "9 8 7 6 5 (corrected printing 2007)" you have a copy from the second printing, if it reads "9 8 (corrected at 8^{th} printing 2009)" you have a copy from the third printing.

- The following abbreviations are used in this document: PRML (Pattern Recognition and Machine Learning), l.h.s. (left hand side) and r.h.s. (right hand side).

Acknowledgements

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Corrections

Page 49 Second paragraph, line –2: Both occurrences of $\ln$ should be replaced by $\log_2$.

Page 57 Line –4: $I(\mathbf{x}, \mathbf{y})$ should be $\mathrm{I}[\mathbf{x}, \mathbf{y}]$.

Page 222 Exercise 4.16, line 4: t should be t_n.

Page 238 Equation (5.37): "for all $\mathbf{v}$" should be "for all $\mathbf{v} \neq \mathbf{0}$".

Page 239 First line after Equation (5.39): "'strictly" should be inserted before the second "positive".

Page 241 Second paragraph, line 2: "To see, this" should be "To see this,".

Page 257 Section 5.5.1, line 1: An "it" should be inserted before the last "is".

Page 267 First paragraph: Both occurrences of $O(\xi)$ should be replaced by $O(\xi^2)$. On the first line following Equation (5.133), "to leading order in ξ" should be replaced by "to order ξ^2"

Page 268 Line 1: Insert "a" before "whole".

Page 270–272 Section 5.5.7, from Equation (5.139) onwards: With the introduction of the σ_j^2s, the regularization coefficient becomes irrelevant and hence it can be dropped from text and equations.

Page 273 Equation (5.148): $\mathbf{I}$ should multiply $\sigma_k^2(\mathbf{x})$ on the r.h.s.

Page 275 Equation (5.153): $\mathbf{I}$ should multiply $\sigma_k^2(\mathbf{x}_n, \mathbf{w})$ on the r.h.s.

Page 295 Second paragraph, Line –2: The period ('.') should be moved up to the previous line.

Page 329 Second paragraph, Line –2: "bounded below" should be "bounded above".

Page 347 Second paragraph: In the one but last sentence, following $\phi_i(\mathbf{x}_n)$, insert "for $i = 1, \ldots, N$ and $\Phi_{nM} = 1$ for $n = 1, \ldots, N$" before the comma. The last sentence should be omitted.

Page 413 Equation (8.93): f_s should be f under the summation operator on the r.h.s.

Page 434 Equation (9.15): σ_j should be σ_j^D in the denominator on the r.h.s.

Page 435 Third paragraph, line 3: "will play" and "discuss" should be "played" and "discussed', respectively.'

Page 440 Second paragraph, line 4: Insert "log" before "likelihood".

Page 443 Equation (9.39): The first line of this equation should read

$$\mathbb{E}[z_{nk}] = \frac{\sum_{\mathbf{z}_n} z_{nk} \prod_{k'} \left[\pi_{k'} \mathcal{N}(\mathbf{x}_n|\boldsymbol{\mu}_{k'}, \boldsymbol{\Sigma}_{k'})\right]^{z_{nk'}}}{\sum_{\mathbf{z}_n} \prod_{j} \left[\pi_j \mathcal{N}(\mathbf{x}_n|\boldsymbol{\mu}_j, \boldsymbol{\Sigma}_j)\right]^{z_{nj}}}.$$

Page 453 Line 6: "convex" should be "concave".

Page 607 Equation (13.1): The r.h.s. should read

$$p(\mathbf{x}_1) \prod_{n=2}^{N} p(\mathbf{x}_n|\mathbf{x}_1, \ldots, \mathbf{x}_{n-1}).$$

Page 616 Equation (13.16): The the rightmost expression should read

$$\sum_{\mathbf{z}_{n-1}, \mathbf{z}_n} \xi(\mathbf{z}_{n-1}, \mathbf{z}_n) z_{n-1,j} z_{nk}.$$

Page 624 Third paragraph, line –2: "seen" should be "occur".

Page 626 Equation (13.51): f should be replaced by $\mathbf{z}$ to the right of the arrow in the (subscript) message indices on both sides.

Page 639 Last paragraph: All instances of $\mathbf{C}\mathbf{A}\mathbf{z}_{n-1}$ should be replaced by $\mathbf{C}\mathbf{A}\boldsymbol{\mu}_{n-1}$.

Page 645 Paragraph –2, line –3: $p(\mathbf{z}_n|\mathbf{x}_n)$ should be $p(\mathbf{z}_n|\mathbf{X}_n)$.

Page 666 Equation (14.32): Insert a minus sign('$-$') before the summation on the r.h.s. and remove the word "negative" from the preceding line.

Page 666 First sentence after Equation (14.33): This sentence should read: "These both vanish if $p_{\tau k} = 1$ for any one $k = 1, \ldots, K$ (in which case $p_{\tau j} = 0$ for all $j \neq k$) and have their maxima at $p_{\tau k} = 1/K$ for all $k = 1, \ldots, K$."