Errata

Matrix Algebra From a Statistician's Perspective

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The paperback and online versions of the book contain some errors, and the corrections to these versions are given on the following pages.

Preface

Page vi (Preface), line 16. Delete the comma after the word And.

8
Inverse Matrices

Page 87, line 2. Delete the parentheses enclosing $\mathbf{a}_{k_1}, \mathbf{a}_{k_2}, \ldots, \mathbf{a}_{k_n}$.

Page 87, line 13. Delete the parentheses enclosing $\mathbf{a}'_{k_1}, \mathbf{a}'_{k_2}, \ldots, \mathbf{a}'_{k_n}$.

Page 87, line 14. Replace k (in the condition $k = 3$) with n.

The online version of the original chapter can be found at
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13
Determinants

Page 194, line 9. Replace a_{ij} with $a_{i'j}$.

Page 194, line 16. Replace the phrase *adjoint matrix* with the phrase *adjoint* (or *adjoint matrix*).

Page 194, line 8 from the bottom. Insert the word as after the word and.

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21
Eigenvalues and Eigenvectors

Theorem 21.5.6 and its proof (pages 539–540). Make the following changes:

(1) Take the equation number (5.2) to be the equation number for the inequalities that appear on line 3 of the theorem rather than for the result that appears on line 11 of the proof.

(2) Replace the first sentence of paragraph 2 of the proof with the following sentence: Now, suppose that $\mathbf{A}$ is symmetric, and take $\mathbf{x}_1$ and $\mathbf{x}_2$ to be any nonnull vectors for which the inequalities (5.2) hold for every nonnull vector $\mathbf{x}$ in $\mathcal{R}^n$.

(3) Modify line 6 of paragraph 2 of the proof by deleting the phrase [as is evident from result (5.2)].

(4) (Optional) Dispensing with (3) above, replace the first sentence of paragraph 2 of the proof as in (2) above and replace the remainder of paragraph 2 with the following development: And observe that, for $\mathbf{x} \neq \mathbf{0}$,

$$\frac{1}{\mathbf{x}'\mathbf{x}}\mathbf{x}'[\mathbf{A} - (\mathbf{x}_1'\mathbf{A}\mathbf{x}_1/\mathbf{x}_1'\mathbf{x}_1)\mathbf{I}_n]\mathbf{x} \geq 0$$

or, equivalently, $\mathbf{x}'[\mathbf{A}-(\mathbf{x}_1'\mathbf{A}\mathbf{x}_1/\mathbf{x}_1'\mathbf{x}_1)\mathbf{I}_n]\mathbf{x} \geq 0$. Thus, $\mathbf{A}-(\mathbf{x}_1'\mathbf{A}\mathbf{x}_1/\mathbf{x}_1'\mathbf{x}_1)\mathbf{I}_n$ is a symmetric nonnegative definite matrix, and upon observing that

$$\mathbf{x}_1'[\mathbf{A} - (\mathbf{x}_1'\mathbf{A}\mathbf{x}_1/\mathbf{x}_1'\mathbf{x}_1)\mathbf{I}_n]\mathbf{x}_1 = 0,$$

it follows from Corollary 14.3.11 that

$$[\mathbf{A} - (\mathbf{x}_1'\mathbf{A}\mathbf{x}_1/\mathbf{x}_1'\mathbf{x}_1)\mathbf{I}_n]\mathbf{x}_1 = \mathbf{0}.$$

It is now clear that $\mathbf{x}_1'\mathbf{A}\mathbf{x}_1/\mathbf{x}_1'\mathbf{x}_1$ is an eigenvalue of $\mathbf{A}$, that $\mathbf{x}_1$ is an eigenvector of $\mathbf{A}$ corresponding to $\mathbf{x}_1'\mathbf{A}\mathbf{x}_1/\mathbf{x}_1'\mathbf{x}_1$, and (since if λ is an eigenvalue of $\mathbf{A}$, $\lambda = \mathbf{x}'\mathbf{A}\mathbf{x}/\mathbf{x}'\mathbf{x}$ for some nonnull vector $\mathbf{x}$) that $\mathbf{x}_1'\mathbf{A}\mathbf{x}_1/\mathbf{x}_1'\mathbf{x}_1$ is the smallest eigenvalue of $\mathbf{A}$. It follows from a similar argument that $\mathbf{x}_2'\mathbf{A}\mathbf{x}_2/\mathbf{x}_2'\mathbf{x}_2$ is an eigenvalue of $\mathbf{A}$, that $\mathbf{x}_2$ is an eigenvector of $\mathbf{A}$ corresponding to $\mathbf{x}_2'\mathbf{A}\mathbf{x}_2/\mathbf{x}_2'\mathbf{x}_2$, and that $\mathbf{x}_2'\mathbf{A}\mathbf{x}_2/\mathbf{x}_2'\mathbf{x}_2$ is the largest eigenvalue of $\mathbf{A}$.

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