List of Errata for the Book
Mathematical Pictures at a Data Science Exhibition

Simon Foucart

This list was last updated on December 3, 2025. Please notify me of further errors by sending an e-mail to `foucart@tamu.edu`.

Chapter 4: Support Vector Machines

- Page 25, Theorem 4.1: one can even conclude that

$$T \leq \left\lfloor R^2 \|\widetilde{w}^*\|_2^2 \right\rfloor,$$

  i.e., replace the ceiling by the floor. To see this, at the end of the proof, notice that a contradiction arises if $T > R^2\|\widetilde{w}^*\|_2^2$, which leads to $T \leq R^2\|\widetilde{w}^*\|_2^2$ and in turn, since T is an integer, to $T \leq \left\lfloor R^2 \|\widetilde{w}^*\|_2^2 \right\rfloor$

- Page 28, Line 8:iIn the first summation, the upper limit should read m, not n

Chapter 5: Reproducing Kernel Hilbert Spaces

- Page 40, Exercise 5.5: one should also assume the subspace $\widetilde{H}$ to be closed

Chapter 17: Sparse Recovery from One-Bit Observations

- Pages 143-144: in the proof of Lemma 17.4, replace all the $\|Av\|_2$ by $\|Av\|_1$, i.e., the ℓ_2-norms on $\mathbb{R}^m$ should be ℓ_1-norms.

Chapter 20: Snippets of Linear Programming

- Page 172, Line 31: the supports S^{k+1} and S^k should be indexed using superscripts, not subscripts

- Page 175, Exercise 20.2: $k \in [1:n]$ should read $k \in [1:d]$ instead

Chapter 25: Expressiveness of Shallow Networks

- Page 217, Lines 14 and 16: the set '$\{\exp(\langle v_i, x\rangle), x \in \mathcal{X}\}$' should be replaced by the set '$\{\langle v_i, x\rangle, x \in \mathcal{X}\}$'

Appendix B: Probability Theory

- Page 261: as stated, Lemma B.4 is only valid for $t \geq 0$. A correct statement is

$$\mathbb{E}[\exp(t|g|)] \leq \left(1 + \sqrt{\frac{2}{\pi}}t + c(t^2 + t^4)\right)\exp\left(\frac{t^2}{2}\right), \qquad t \in \mathbb{R},$$

  for a constant $c \geq 0$ made explicit below. For $t \geq 0$, this holds with $c = 0$, while following the previous argument gives, for $t \geq 0$,

$$\mathbb{E}[\exp(-t|g|)] = \sqrt{\frac{2}{\pi}}\left(\int_t^\infty \exp\left(-\frac{v^2}{2}\right)dv\right)\exp\left(\frac{t^2}{2}\right).$$

  One can finish by noticing that

$$\begin{aligned}\sqrt{\frac{2}{\pi}}\int_t^\infty \exp\left(-\frac{v^2}{2}\right)dv &= 1 - \int_{-t}^t \frac{\exp(-v^2/2)}{\sqrt{2\pi}}dv \leq 1 - \int_{-t}^t \frac{1 - v^2/2}{\sqrt{2\pi}}dv \\ &= 1 - \sqrt{\frac{2}{\pi}}t + \frac{1}{\sqrt{18\pi}}t^3 \leq 1 - \sqrt{\frac{2}{\pi}}t + \frac{1}{\sqrt{72\pi}}(t^2 + t^4).\end{aligned}$$

- Page 269, Line 9: an opening parenthesis is missing before ρ
- Page 270, Line 14: The assertion that the $\varepsilon_{i,j}$ are independent is unjustified and, in fact, incorrect. Refer to the original argument of [T. Cai, A. Zhang, ROP: Matrix recovery via rank-one projections. The Annals of Statistics, 43/1, 102–138, 2015] while I rectify the proof of Theorem B.12

Appendix D: Matrix Analysis

- Page 295, Line 13: a factor 2 is missing for the middle sum

Appendix E: Approximation Theory

- Page 299, Line 8: instead of '$u(z) \neq 0$', one should read '$u(y) \neq 0$'
- Page 301, Line 15: $\|F\|_{\mathcal{X}\times\mathcal{X}}$ should be $\|F\|_{C(\mathcal{X}\times\mathcal{X})}$
- Page 310, Line 11: a division by 2π is missing in the right-hand side