Errata for "Concentration inequalities: a nonasymptotic theory of independence" by Stéphane Boucheron, Gábor Lugosi, and Pascal Massart Oxford University Press, 2013

November 17, 2015

• page 7, l. 15. replace "to the sub-Gaussian tail bound" by "the sub-Gaussian tail bound". (Pointed out by Sasha Rakhlin)

• page 30, line 4 in the proof of Theorem 2.3: $\frac{e^{-t}}{t}$ should be e^{-t}. (Pointed out by Kengo Kato and Songfeng Zheng.)

• page 30, line 7 in the proof of Theorem 2.3: e^{-t} should be e^{-t}/t. (Pointed out by Songfeng Zheng.)

• page 41, l. 6. replace "and indeed, W is an isoperimetry from $\mathbb{R}^D$ into $L_{2,d}$." by "and indeed, in expectation, W is an isoperimetry from $\mathbb{R}^D$ into $L_{2,d}$."
(Pointed out by Sasha Rakhlin.)

• page 42, third displayed equation should read:

$$\mathbb{P}\left\{\sup_{\alpha\in T}\left|\sum_{i=1}^{d}\left(W_i(\alpha)^2-1\right)\right|\geq\sqrt{8vdt}+4vt\right\}\leq 2Ne^{-t}\leq n^2e^{-t}\ .$$

(there is an unnecessary square in the sum. Pointed out by Sohail Bahmani.)

• page 42, in the fourth displayed equation

$$8v\left(\sqrt{d\log\frac{n}{\sqrt{\delta}}}\right)$$

should be replaced by

$$8v\left(\sqrt{d\log\frac{n}{\sqrt{\delta}}}\right)+8v\log\frac{n}{\sqrt{\delta}}$$

(Pointed out by Kengo Kato, Lam Pham, Sasha Rakhlin, and Songfeng Zheng.)

• page 42, in the fifth and sixth displayed equations

$$\sqrt{\frac{8v\log\left(n/\sqrt{\delta}\right)}{d}}$$

should be replaced by

$$8v\sqrt{\frac{\log\left(n/\sqrt{\delta}\right)}{d}}$$

(Pointed out by Kengo Kato, Lam Pham, and Songfeng Zheng.)

• page 49, Exercise 2.18, line 5: the lower bound for n is e^{1+e^2} rather than e^3. (Pointed out by Sohail Bahmani.)

• page 54, line -3: replace the displayed fomula by

$$v = \sum_{i=1}^{n} \inf_{Z_i} \mathbf{E}\left[(Z - Z_i)^2\right] \ ,$$

(Pointed out by Sasha Rakhlin.)

• page 67, line 10: on the right-hand side of the displayed equation, the square should be outside of the parentheses. It should read

$$\sum_{i=1}^{n}(Z - Z_i)^2 \quad = \quad \sum_{i=1}^{n}\left((f(X) - f\left(\overline{X}^{(i)}\right)\right)^2$$

(Pointed out by Laci Györfi and Sasha Rakhlin.)

• page 104, line 7, end of proof of Theorem 4.20: the right-hand side of the display should be $h(a, p)$ instead of $h(p, a)$.

• page 104: the left-hand side inequality in Theorem 4.21 (i.e., $a \leq h(a, (1-a)/N)$) is not true. The correct form of Birgé's inequality is

$$h\left(a, \frac{1-a}{N}\right) \leq \frac{1}{N}\sum_{i=1}^{N} D(\boldsymbol{P}_i \| \boldsymbol{P}_o)$$

(pointed out by Sergio Verdú).

• page 132, line 13: replace D by Δ. Thus, it should read "the condition $d \geq \kappa(\Delta + \log(2/\delta))\epsilon^{-2}$ is satisfied"
(Pointed out by Sasha Rakhlin.)

• page 179, line -8: replace $\frac{\phi(\lambda)}{\mathbb{E}e^{\lambda Z}}$ by $\frac{\phi(\lambda)}{\lambda^2\mathbb{E}e^{\lambda Z}}$

• page 179, line -7: replace $v\phi(\lambda)$ by $\frac{v\phi(\lambda)}{\lambda^2}$
(Pointed out by Sasha Rakhlin.)

• page 191, line -6: replace $f(x) - f_i(x^{(i)}) \leq 1$ by $0 \leq f(x) - f_i(x^{(i)}) \leq 1$
(Pointed out by Sasha Rakhlin.)

• page 217, line 5: replace $f_{A(x)=d(x,A)}$ by $f_A(x) = d(x, A)$
(Pointed out by Sasha Rakhlin.)

• page 258: in equation (8.8) replace $\sum_{i=1}^{n-1}$ by $\sum_{i=1}^{k-1}$
(Pointed out by Sasha Rakhlin.)

• page 284, last display before Theorem 9.17: the denominator should be $2c(p)p(1-p)$ instead of $2c(p)/(p(1-p))$. (Pointed out by Santosh Kumar.)

• page 284, display of Theorem 9.17: the denominator should be $c(p)p(1-p)$ instead of $c(p)/(p(1-p))$

• page 285, last display: all three occurrances of $c(p)/(p(1-p))$ in the denominators should be replaced by $c(p)p(1-p)$.

• page 286, first line: $c(p)/(p(1-p)) \leq 1/2$ should be replaced by $c(p)p(1-p) \leq 1/2$.

• page 291, lines 3-4: "minimal volume among those with a given surface area" should be replaced by "minimal surface area among those with a given volume"
(Pointed out by Sasha Rakhlin.)

• page 301, last line: a factor of p is missing from the left-hand side of the display; it should be $pI^p(A)$.

• page 303, line -3: $\epsilon_{i,j}$ should be $\epsilon_{1,j}$.

• page 324, statement of Theorem 11.6: "let $\phi_i : \mathbb{R} \to \mathbb{R}$ be a Lipschitz function" should be "let $\phi_i : \mathbb{R} \to \mathbb{R}$ be a 1-Lipschitz function"
(Pointed out by Kengo Kato, Lam Pham, and Songfeng Zheng).

• page 324, line 15: replace $(\alpha_i x_i, \ldots, \alpha_n x_n)$ by $(\alpha_1 x_1, \ldots, \alpha_n x_n)$.

• page 328, statement of Theorem 11.8: on the right hand side of the display "$8\mathbf{E}Z$" should be replaced by "$8\mathbf{E}\sup_{s\in\mathcal{T}} |\sum_{i=1}^n X_{i,s}|$"
(Pointed out by Kengo Kato, Lam Pham, and Songfeng Zheng).

• page 332, line 1: "$Z_j < s$ for all $j < k$" should be "$Z_j < t$ for all $j < k$"
(Pointed out by Kengo Kato, Lam Pham, and Songfeng Zheng.)

• page 334, statement of Theorem 11.17: "$Z = \sup_{s\in\mathcal{T}} \sum_{i=1}^n X_{i,s}$" should be replaced by "$Z = \sup_{s\in\mathcal{T}} |\sum_{i=1}^n X_{i,s}|$". The right-hand side in the upper bound should be

$$\sigma^2 + 16\sqrt{\mathbf{E}M}\mathbf{E}Z + 2 \times 18^2 \mathbf{E}M\,.$$

• page 338, Exercise 11.11, line 3: "denote a Lipschitz function" should be "denote a 1-Lipschitz function".

• page 343, line -9: the right-hand side of the displayed equation should be

$$\frac{\lambda}{1-\lambda}\left(\Sigma^2\left(e^{\lambda}-1\right)+\lambda\sigma^2\right)$$

(Pointed out by Kengo Kato, Lam Pham, and Songfeng Zheng.)

• page 344, statement of Theorem 12.3: replace "$e^{-t/4}$" by "$e^{1-t/4}$" on the right-hand side of both the second and third displayed equations.
(Pointed out by Kengo Kato, Lam Pham, and Songfeng Zheng.)

• page 345, line 2: replace "$e^{-\gamma t}$" by "$e^{1-\gamma t}$" on the right-hand side of the displayed equation.
(Pointed out by Kengo Kato, Lam Pham, and Songfeng Zheng.)

• page 345, line -8: "$W' = \sup_{s\in\mathcal{T}}(X_{i,s}-X'_{i,s})^2$" should be replaced by $W' = \sup_{s\in\mathcal{T}}\sum_{i=1}^{n}(X_{i,s}-X'_{i,s})^2$.
(Pointed out by Kengo Kato, Lam Pham, and Songfeng Zheng).

• page 346, last line: the displayed equation should be

$$\mathbf{P}\left\{Z \geq \mathbf{E}Z + 7\sqrt{t\Sigma^2}+3t\right\} \leq 5e^{-t/4}\,.$$

• page 367, line 12: "$\lim_{\|x\|\to\infty} f(x)e^{-a\|x\|^2} = 0$ and $X = (X_1,\ldots,X_d)$" should be replaced by "$\lim_{\|x\|\to\infty} F(x)e^{-a\|x\|^2} = 0$ and $X = (X_1,\ldots,X_n)$"
(Pointed out by Kengo Kato, Lam Pham, and Songfeng Zheng and Sasha Rakhlin.)

• page 375, line -14: "$\sum_{j=1}^{d}\left(u^T g_{i,j}\right)^2 = 1$" should be replaced by "$\sum_{j=1}^{d}\left(u^T g_{i,j}\right)^2 \leq 1$"
(Pointed out by Kengo Kato, Lam Pham, and Songfeng Zheng.)

• page 381, line -1: "$16\epsilon_*$" should be "$20\epsilon_*$".

• page 382, line -1: "$16\epsilon_*$" should be "$20\epsilon_*$".

• page 383, first display, second line: "$\ldots(2+16\epsilon_*) \leq 12\epsilon_*$" should be "$\ldots(2+20\epsilon_*) \leq 15\epsilon_*$"

• page 383, line 15: "$d \geq 20(16^2 d\epsilon_*^2+\log(2/\delta))\epsilon^{-2}$" should be replaced by "$d \geq 20(20^2 d\epsilon_*^2+\log(2/\delta))\epsilon^{-2}$"

• page 384, line -12: replace "$Z = d\sup_{\alpha\in\mathcal{T}}\|W(\alpha)\|$" by "$Z = \sqrt{d}\sup_{\alpha\in\mathcal{T}}\|W(\alpha)\|$"
(Pointed out by Kengo Kato, Lam Pham, and Songfeng Zheng).

• page 388, line -7: replace $4\psi(r)$ by $6\psi(r)$ on the right-hand side of the displayed equation.
(Pointed out by Kevin Jamieson.)

• page 394, line 8: Let r_* be the nonnegative solution of $\sqrt{n}r^2 = \phi(\rho(r))$. (The equation is missing the = sign.)
Pointed out by Kevin Jamieson.)

• page 402, in the hint to Exercise 13.13, the set $\{(x,t) : f(x) \ \leq t < f'(x) \wedge f'(x) \leq t < f(x)\}$ should be defined as $\{(x,t) : f(x) \ \leq t < f'(x) \vee f'(x) \leq t < f(x)\}$. Also, replace "Theorem 13.6" by "Lemma 13.6"
(Pointed out by Fabian Gieringer.)

• page 414, last line: "$Y_2 = (X_1, \ldots, X_n)$" should be "$Y_2 = (X_2, \ldots, X_n)$"
(Pointed out by Kengo Kato, Lam Pham, and Songfeng Zheng).

• page 432, lines 3-4: replace "The lemma follows by taking $\phi(x) = x^{q/\alpha}$ and applying Theorem 14.6 with $f(z) = z^\alpha$" by "The lemma follows by taking $\Phi(x) = x^{q/\alpha}$ and applying Theorem 14.6 with $\eta(z) = z^\alpha$"
(Pointed out by Kengo Kato, Lam Pham, and Songfeng Zheng).

• page 433, line 8: replace $q \in [k+1, k+2)$ by $q \in [k, k+1)$
(Pointed out by Kengo Kato, Lam Pham, and Songfeng Zheng.)

• page 435, line -4: replace the displayed equation

$$\|(Z - \mathbb{E}Z)_+\| \leq \sqrt{2\,\|V^+\|_1} \leq \sqrt{2\kappa_q\,\|V^+\|_{1\vee q/2}}$$

by

$$\|(Z - \mathbb{E}Z)_+\| \leq \sqrt{\|V^+\|_1} \leq \sqrt{2\kappa_q\,\|V^+\|_{1\vee q/2}\,(1 - 1/q)}$$

(Pointed out by Kengo Kato, Lam Pham, and Songfeng Zheng).

• page 444, line -4: "Lemma 11.17" should be "Theorem 11.17"
(Pointed out by Kengo Kato, Lam Pham, and Songfeng Zheng.)

• page 461, line 9: The authors of "Inequalities" are G.H. Hardy, J.E: Littlewood, and G. Pólya (pointed out by Yuval Peres).