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ERRATUM

Erratum to: Stability of noisy Metropolis–Hastings

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The statement of Proposition 4.1 is incorrect. We present the corrected result with its proof.

Proposition 4.1 *Assume (P1), (P2), (W4), (W5). Alternatively, assume (P1*), (P2) and (W5). Then, there exists $D_k > 0$ and $N_0 \in \mathbb{N}^+$ such that for all $N \geq N_0$,*

$$\|\tilde{\pi}_N(\cdot) - \pi(\cdot)\|_{TV} \leq D_k \frac{\log(N)}{N^{\frac{\tau}{2+k}}},$$

where $\tau = k$ if $k \in (0, 1)$ and $\tau = \frac{1+k}{2}$ if $k \geq 1$. If in addition (W5) holds for all $k > 0$, then for any $\varepsilon \in (0, 1/6)$ there will exist $D_\varepsilon > 0$ and $N_0 \in \mathbb{N}^+$ such that for all $N \geq N_0$,

$$\|\tilde{\pi}_N(\cdot) - \pi(\cdot)\|_{TV} \leq D_\varepsilon \frac{\log(N)}{N^{\frac{1}{2}-\varepsilon}}.$$

Proof The proof is identical to the original version up to the inequality

$$\sup_{x\in\mathcal{X}} \|\tilde{P}_N(x,\cdot) - P(x,\cdot)\|_{TV} \leq 3\delta + \frac{2^{3+k}}{\delta^{1+k}} \sup_{x\in\mathcal{X}} \mathbb{E}\left[\left|W_{x,N} - 1\right|^{1+k}\right].$$

By the Marcinkiewicz–Zygmund inequality for i.i.d random variables (see, e.g., Gut 2012, Chapter 3, Corollary 8.2), there exists $B_k < \infty$ such that

$$\mathbb{E}\left[\left|W_{x,N} - 1\right|^{1+k}\right] \leq B_k \mathbb{E}\left[\left|W_x - 1\right|^{1+k}\right] N^{-\tau},$$

where

$$\tau = \begin{cases} k & \text{if } k \in (0, 1) \\ \frac{1+k}{2} & \text{if } k \geq 1. \end{cases}$$

Therefore,

$$\sup_{x\in\mathcal{X}} \|\tilde{P}_N(x,\cdot) - P(x,\cdot)\|_{TV} \leq 3\delta + \frac{2^{3+k} B_k}{\delta^{1+k} N^\tau} \sup_{x\in\mathcal{X}} \mathbb{E}\left[\left|W_x - 1\right|^{1+k}\right].$$

The first part of the result follows from the original proof by taking

$$C_k = B_k \sup_{x\in\mathcal{X}} \mathbb{E}\left[\left|W_x - 1\right|^{1+k}\right]$$

and considering N^τ instead of N^k.

For the second claim, take $k_\varepsilon \geq (2\varepsilon)^{-1} - 2 \geq 1$ and apply the first part. □

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