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Correction to: "Kullback Leibler property of kernel mixture priors in Bayesian density estimation"

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The argument given in the last paragraph of the proof of Theorem 2 is not correct. This is used to verify

$$\sup\{K(x;\theta,\phi) : x \in C, \theta \in E^c\} < c\epsilon/4.$$

in Condition A9. However, this requirement in Condition A9 can be completely dropped to weaken the condition to

A9. for any given $\phi \in A$ and compact $C \subset \mathfrak{X}$, such that the family of maps $\{\theta \mapsto K(x;\theta,\phi), x \in C\}$ is uniformly equicontinuous on D.

By weakening Condition A9 in Lemma 3, we not only easily rectify the proof of Theorem 2 but also make the conditions of the Theorem 2 weaker. To see this, observe that as $\operatorname{supp}(P_\epsilon) \in D$,

$$\int_C f_0(x) \log \frac{f_{P_\epsilon,\phi}(x)}{f_{P,\phi}(x)} dx \leq \int_C f_0(x) \log \frac{\int_D K(x,\theta,\phi) dP_\epsilon(\theta)}{\int_D K(x,\theta,\phi) dP(\theta)} dx. \tag{1}$$

From the equicontinuity condition, given $\delta > 0$, choose $x_1, x_2, \ldots, x_m$ such that, for any $x \in C$, there exists x_i satisfying

$$\sup_{\theta \in D} |K(x,\theta,\phi) - K(x_i,\theta,\phi)| < c\delta.$$

We can assume without loss of generality that $P_\epsilon(\partial D) = 0$. Now by arguments as before, defining a weak neighborhood $\mathscr{U} = \{P : |\int_D K(x_i, \theta, \phi)dP - \int_D K(x, \theta, \phi)dP_\epsilon| < c\delta$ for $i = 1, \ldots, m\}$, we have for any $P \in \mathscr{U}$ and $x \in C$,

$$\left| \int_D K(x; \theta, \phi)dP(\theta) - \int_D K(x; \theta, \phi)dP_\epsilon(\theta) \right| < 3c\delta < c\left(\frac{\epsilon}{4} + 3\delta\right).$$

It then follows by similar arguments that the right hand side of (1) is bounded by $\epsilon/2$ completing the proof of Lemma 3. As a consequence, we can completely remove Condition B9 from Theorems 2 and 3.