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# Unified estimation of densities on bounded and unbounded domains

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**Abstract** Kernel density estimation in domains with boundaries is known to suffer from undesirable boundary effects. We show that in the case of smooth densities, a general and elegant approach is to estimate an extension of the density. The resulting estimators in domains with boundaries have biases and variances expressed in terms of density extensions and extension parameters. The result is that they have the same rates at boundary and interior points of the domain. Contrary to the extant literature, our estimators require no kernel modification near the boundary and kernels commonly used for estimation on the real line can be applied. Densities defined on the half-axis and in a unit interval are considered. The results are applied to estimation of densities that are discontinuous or have discontinuous derivatives, where they yield the same rates of convergence as for smooth densities on $\mathbb{R}$.

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