

**Marron, J. S.; Wand, M. P.**

**Exact mean integrated squared error.** (English) Zbl 0746.62040  
*Ann. Stat.* 20, No. 2, 712-736 (1992).

Summary: An exact and easily computable expression for the mean integrated squared error (MISE) for the kernel estimator of a general normal mixture density is given for Gaussian kernels of arbitrary order. This provides a powerful new way of understanding density estimation which complements the usual tools of simulation and asymptotic analysis. The family of normal mixture densities is very flexible and the formulae derived allow simple exact analysis for a wide variety of density shapes.

A number of applications of this method giving important new insights into kernel density estimation are presented. Among these is the discovery that the usual asymptotic approximations to the MISE can be quite inaccurate, especially when the underlying density contains substantial fine structure and also strong evidence that the practical importance of higher order kernels is surprisingly small for moderate sample sizes.

**MSC:**

[62G07](#) Density estimation  
[65C99](#) Probabilistic methods, stochastic differential equations  
[65D30](#) Numerical integration

Cited in **5** Reviews  
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**Keywords:**

window width; mean integrated squared error; general normal mixture density; Gaussian kernels of arbitrary order; kernel density estimation; asymptotic approximations

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