

THE USE OF VARIABLE KERNEL MASS IN DENSITY ESTIMATION

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Abstract: A new theoretical approach is developed for estimating a univariate density $f(x)$, for large n , using a nonnegative symmetric kernel with variable mass. Compared to kernels of order 4, kernels of variable mass asymptotically achieve (i) smaller variance, (ii) essentially the same bias, and so (iii) a reduced MISE of order $O(n^{-8/9})$. The analysis uses a common MISE-optimal bandwidth h and locally adapted kernel mass $M(X) = 1 - (f''(X)h^2)/(24\bar{f}(X))$, to be estimated at the kernel center, where $\bar{f}(X)$ is the average f value over an interval of length h centered on X . Mass adaptation derives from considering the expected effect of negative mass, in kernels of order 4, upon the positive part of such kernels. Unlike the Abramson procedure for varying local bandwidth, this procedure does not require any special accommodation for small values of $f(X)$, for f in C^4 .

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