

Bootstrap Bandwidth Selection Using an h -Dependent Pilot Bandwidth

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Abstract

The problem of choosing the bandwidth h for kernel density estimation is considered (see Wand and Jones, 1995). All the plug-in and bootstrap bandwidth selection methods require the use of a pilot bandwidth g and the usual way to make an h -dependent choice of g is by obtaining their asymptotic expressions separately and solving the two equations for the sample size n . In contrast, we obtain the asymptotically optimal value of g for every *fixed* h , thus making our selection "less asymptotic". Exact error expressions show that some usually assumed hypotheses have to be discarded in the asymptotic study in this case. Based on this idea, two versions of a new bootstrap-type bandwidth selector are proposed, and their properties are analyzed through theoretical results and a simulation study. The new selector can achieve the best possible rate with the minimal asymptotic variance, and the simulations show that in practice one version of this selector provides a good compromise between cross-validation and the popular Sheather-Jones method (Sheather and Jones, 1991): it is not so variable as cross-validation and its centerpoint is significantly less biased than that of the Sheather-Jones bandwidth selector in most cases.

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References

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