

## Small nonparametric tolerance regions

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## Small nonparametric tolerance regions\*

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### Abstract

We present a new, natural way to construct nonparametric multivariate tolerance regions. Unlike the classical nonparametric tolerance intervals, where the endpoints of the tolerance intervals are determined by beforehand chosen order statistics, we take the shortest interval, that contains a certain number of observations. We extend this idea to higher dimensions by replacing the class of intervals with other classes of sets, like ellipsoids, hyperrectangles or convex sets. The asymptotic behaviour of our tolerance regions is derived using empirical process theory, in particular the concept of generalized quantiles. Finite sample properties of our tolerance regions are investigated through a simulation study.

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**Key words and phrases.** Nonparametric tolerance region, empirical process, asymptotic normality, minimal volume set.

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