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Citation for published version (APA):

Di Bucchianico, A., Einmahl, J. H. J., & Mushkudiani, N. A. (1998). *Small nonparametric tolerance regions*. (Memorandum COSOR; Vol. 9816). Technische Universiteit Eindhoven.

Document status and date:

Published: 01/01/1998

Document Version:

Publisher's PDF, also known as Version of Record (includes final page, issue and volume numbers)

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
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Small nonparametric tolerance regions*

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July 28, 1998

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.

AMS 1991 subject classification. 62G15, 62G20, 62G30, 60F05.

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

*Research partially supported by European Union HCM grant ERB CHRX-CT 940693.