## Nonparametric Methods for Measurements with Detection Limits

by

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## Abstract

Analytical data are often subject to censoring when the actual values to be quantified are beyond the limit of detection. The primary focus of this talk is statistical inference for the two-sample problem. Most of the current publications are centered around naive approaches or the parametric Tobit model approach. These methods may not be suitable for data with high censoring rates and relatively small sample sizes. In this talk, we establish the theoretical equivalence of three nonparametric methods: the Wilcoxon rank sum, the Gehan, and the Peto-Peto tests, under fixed left-censoring (due to lower detection limit) and other mild conditions. We then develop a nonparametric point and interval estimation procedure for the location shift model. A large set of simulations compares 14 methods including naive, parametric, and nonparametric methods. Two-sample inference for data with right-censorship or double censorship is also addressed. In addition, correction of bias under extreme small sample sizes is discussed.

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