

An Adaptive Nonparametric Method in Bench-mark Analysis for Bioassay and Environmental Studies

Lizhen Lin^{*}, University of Arizona
Rabi Bhattacharya, University of Arizona

Abstract

We present a novel adaptive nonparametric method for bioassay and benchmark analysis in risk assessment, which averages isotonic MLEs based on disjoint subgroups of dosages. The asymptotic theory for the methodology is derived in Bhattacharya and Lin (2010), showing that the MISEs (mean integrated squared error) of the estimates of both the dose–response curve F and its inverse F^{-1} achieve the optimal rate $O(N^{-4/5})$. We also compute the asymptotic distribution of the estimate of the effective dosage which is shown to have an optimally small asymptotic variance. A finite sample study is carried out in Bhattacharya and Lin (2011) in comparison with some other methods such as the leading new method DNP due to Dette and Scheder (2010). In the majority of the cases, our new method performs the best among those compared.

Keywords: Bioassay; Effective dosage; Risk assessment; MISE; Nonparametric methodology; Optimal asymptotics.

^{*} Presenting author