

GRAND ROUNDS

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Selecting The Models for Small Area Estimation: Applications of The Fence Methods

ABSTRACT

Family We consider applications of a new class of strategies for model selection, known as the fence methods, to small area estimation. The applications are motivated by two real-life problems. The first involves the famous Iowa crops data (Battese, Harter & Fuller 1988; JASA 80, 28-36) that led to the nested error regression model, which has since popularized in small area estimation. The second involves a hospital graft failure dataset which raised a problem of non-parametric model selection. In order to apply the fence methods, we develop a simplified adaptive fence procedure that is more convenient to use for small area estimation problems. The procedure leads to consistent model selection under mild conditions. The new procedure is applied to the problem of selecting a nested error regression model for the Iowa crops data.

Furthermore, we develop an adaptive fence procedure suitable for selecting nonparametric models for small area estimation, which recently have received much attention. The method is applied to the hospital graft failure data for selecting a nonparametric Fay-Herriot type model. Simulation results show impressive performance of the new procedures for both parametric and nonparametric model selection problems, even when the number of small areas is fairly small.

This work is joint with Dr. Thuan Nguyen of Oregon Health and Science University, and Dr. J. Sunil Rao of Case Western Reserve University.