Robust Nonparametric and Semiparametric Model Calibration Estimators by Panelyu Function Method.

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Abstract

Use of nonparametric model calibration estimators for population total and mean has been considered by several authors. In model calibration, a distance measure defined on some design weights thought to be close to the inclusion probabilities, is minimized subject to some calibration constraints imposed on the fitted values of the study variable. The minimization is usually by way of introducing langrage equation whose solution gives the optimal design weights to be used in estimation of population total. Sometimes a solution to the langrage constants does not exist. Numerical approaches are some of the alternatives to the langrage approach. In this paper, we have derived nonparametric and semiparametric model calibration estimators by treating the calibration problem as a nonlinear constrained minimization problem, which we transform to an unconstrained optimization problem using penalty functions. We show that the resulting nonparametric and semiparametric estimators are robust in the sense that they are quite efficient when the model is correctly specified for the data and that the estimators do not fail even when the model is misspecified for the data. When the penalty constant approaches zero, the estimators reduce to the Horvitz Thompson design estimator. Keywords: model calibration, nonparametric model, semiparametric model, penalty function

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