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Nonparametric additive model-assisted estimation for survey data. (English) Zbl 1216.62064
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Summary: An additive model-assisted nonparametric method is investigated to estimate the finite population totals of massive survey data with the aid of auxiliary information. A class of estimators is proposed to improve the precision of the well known Horvitz-Thompson estimators by combining the spline and local polynomial smoothing methods. These estimators are calibrated, asymptotically design-unbiased, consistent, normal and robust in the sense of asymptotically attaining the Godambe-Joshi lower bound to the anticipated variance. A consistent model selection procedure is further developed to select the significant auxiliary variables. The proposed method is sufficiently fast to analyze large survey data of high dimension within seconds. The performance of the proposed method is assessed empirically via simulation studies.

MSC:

[62G08](#) Nonparametric regression and quantile regression
[62D05](#) Sampling theory, sample surveys
[62H12](#) Estimation in multivariate analysis
[62G05](#) Nonparametric estimation

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Keywords:

[calibration](#); [Horvitz-Thompson estimator](#); [local linear regression](#); [spline](#); [superpopulation](#)

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