

Small Area Estimation: Overview, New Developments and Practical Issues

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Demand for reliable small area statistics has greatly increased in recent years. Traditional area-specific direct estimators may not provide adequate precision because small area sample sizes are seldom large enough or even zero for some areas. This makes it necessary to borrow strength from related areas through linking models based on auxiliary information such as recent census and current administrative data, leading to model-based indirect estimates. Model-based methods based on explicit area level or unit level linking models have been extensively studied including empirical best linear unbiased prediction, empirical best (EB) and hierarchical Bayes (HB). In this talk I will first present a brief overview of those methods with particular attention to measures of variability. I will also present some new results: MSE estimation under the original Fay-Herriot method of estimating the model variance in the basic area level model, use of survey weights under the basic unit level model to ensure automatic benchmarking to reliable large area direct estimates, a new jackknife method of estimating MSE under logistic linear mixed models, choice of matching priors on model parameters in the HB method, efficiency comparison between EB and model-assisted GREG estimators under a two-level model, and effect of measurement errors in the auxiliary variables. I will also address several practical issues including strategies at the design stage, multiple objectives and model diagnostics.