

A Noninformative Bayesian Approach to Finite Population Sampling Using Auxiliary Variables

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In finite population sampling prior information is often available in the form of partial knowledge about an auxiliary variable, for example its mean may be known. In such cases, the ratio estimator and the regression estimator are often used for estimating the population mean of the characteristic of interest. The Polya posterior has been developed as a non-informative Bayesian approach to survey sampling. It is appropriate when little or no prior information about the population is available. Here we show that it can be extended to incorporate types of partial prior information about auxiliary variables. We will see that it typically yields procedures with good frequentist properties even in some problems where standard frequentist methods are difficult to apply. Moreover one does not need to select a model which explicitly relates the characteristic of interest to the auxiliary variables.