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A Weighted Likelihood Approach to Model-Based Small Area Estimation with Unit-Level Data

Small area estimation uses area-level or unit-level models. Area-level models apply to direct survey estimates that are typically design consistent, leading to design consistent model predictions. Unit-level models, however, typically apply to survey microdata ignoring the sampling weights, not leading to design consistent model predictions. Kott, Rao and others developed methods to incorporate sampling weights in the unit-level normal nested error regression model to achieve design consistency. We propose a pseudo-likelihood incorporating sampling weights that applies to normal or non-normal data, including binary and count data. Using a Bayesian approach, we apply our method to American Community Survey data.