



Two-stage Benchmarking as Applied to Small Area Estimation

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There has been recent growth in small area estimation due to the need for more precise estimation of small geographic areas, which has led to groups such as the U.S. Census Bureau, Google, and the RAND corporation utilizing small area estimation procedures. We develop novel two-stage benchmarking methodology using a single weighted squared error loss function that combines the loss at the unit level and the area level without any specific distributional assumptions. We consider this loss while benchmarking the weighted means at each level or both the weighted means and weighted variability at the unit level. Multivariate extensions are immediate. We analyze the behavior of our methods using a complex study from the National Health Interview Survey (NHIS) from 2000, which estimates the proportion of people that do not have health insurance for many domains of an Asian subpopulation. Finally, the methodology is explored via simulated data under the proposed model. We ultimately conclude that three proposed benchmarked Bayes estimators do not dominate each other, leaving much exploration for future research.

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