Comparing Temporal Small Area Estimates With and Without Prior Dasymetric Refinement

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The comparison of demographic small area estimates across multiple time periods is hindered by frequent boundary changes in data collection zones. Previous work applies various areal interpolation methods to compare demographic estimates over time, with varying degrees of success. Examples include areal weighting (AW) (Markoff and Shapiro, 1973; Goodchild and Lam, 1980); Dempster's (1977) regression-based EM model used by Flowerdew and Green (1994); and the Target Density Weighting (TDW) method devised by Schroeder (2007). Dasymetric refinement is one type of areal interpolation that employs ancillary data such as land cover; and improves the precision of demographic small area estimates within a single time period. Holt et al (2004) compare estimates across multiple time periods by combining the AW method with dasymetric refinement for one period. However, like population, landcover can also change from one period to the next. This paper expands upon others' work, performing dasymetric refinement for each time period. The refinement (i.e., populated area) could vary in each time period and incorporating landcover differences into each time step will reflect a more realistic relationship between changing population and changing landcover. The question to be addressed specifically is whether incorporation of multi-temporal dasymetric refinement into areal interpolation will improve the accuracy of temporal small area estimates. The paper will explore whether spatial refinement impacts the three areal interpolation methods listed above differently, and if so, will establish demographic contexts in which these differences arise. Data sets include tract-level demography for one metropolitan area exhibiting dramatic growth (Las Vegas, Nevada) during the study period (1990-2010), and another that maintains a relatively stable population (Pittsburgh, Pennsylvania) over the period. Areal interpolation will be performed with and without the dasymetric refinement, and the results compared statistically, as well as validating the accuracy of estimates using blockgroup level data.

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