

**University of California, Irvine
Statistics Seminar**

***Bayesian Spatio-temporal Disaggregation of Survey-based
Estimates of Areal Proportions Accounting
for Survey Design Effect***

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4 p.m., 6011 Bren Hall
(Bldg. #314 on campus map)**

Understanding the effects of neighborhood exposures on health requires data on characteristics of the neighborhoods in which subjects live. However, estimates of these characteristics are often aggregated over space and time in a fashion that diminishes their utility. Take, for example, estimates derived from the American Community Survey (ACS), a multi-year nationwide survey administered by the U.S. Census Bureau: estimates for small municipal areas are aggregated over 5-year periods, whereas 1-year estimates are only available for municipal areas with populations \geq \$65,000.

Researchers may wish to use ACS estimates in studies of population health to characterize neighborhood-level exposures. However, 5-year estimates may not properly characterize temporal changes or align temporally with other data in the study, while the coarse spatial resolution of the 1-year estimates diminishes their utility in characterizing neighborhood exposure. To circumvent this issue, in this paper we propose a Bayesian hierarchical spatio-temporal model to disaggregate estimates of proportions derived from sampling surveys which explicitly accounts for the survey design effect. We illustrate the utility of our model by applying it to the ACS data, generating estimates of poverty and race for the state of Michigan at fine spatio-temporal resolution.

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