THE DEPARTMENT OF EDUCATIONAL PSYCHOLOGY'S RESEARCH METHODS, MEASUREMENT, & EVALUATION (RMME) PROGRAMS AND THE DEPARTMENT OF STATISTICS AT THE UNIVERSITY OF CONNECTICUT PRESENT:

IN DEFENSE OF UNRESTRICTED SPATIAL REGRESSION

DR. DALE ZIMMERMAN, UNIVERSITY OF IOWA

Spatial regression is commonly used in the environmental, social, and other sciences to study relationships between spatially referenced data and other variables, and to predict variables at locations where they are not observed. Spatial confounding, i.e., collinearity between fixed effects and random effects in a spatial regression model, can adversely affect estimates of the fixed effects, and it has been argued that something ought to be done to "fix" it. Restricted spatial regression methods have been proposed as a remedy for spatial confounding. Such methods replace inference for the fixed effects of the original spatial regression model with inference for those effects under a model in which the random effects are restricted to a subspace orthogonal to the column space of the fixed effects model matrix; thus, they "deconfound" the two types of effects. We prove, however, using classical linear model theory, that frequentist inference for the fixed effects of a deconfounded linear model is generally inferior to that for the fixed effects of the original spatial linear model; in fact, it is even inferior to inference for the corresponding nonspatial model (i.e., inference based on ordinary least squares). We show further that deconfounding also leads to inferior predictive inferences. Based on these results, we argue against the use of restricted spatial regression, in favor of plain old (unrestricted) spatial regression. This is joint work with Jay Ver Hoef of NOAA National Marine Mammal Laboratory and was published in 2022 in The American Statistician.

Dr. Dale L. Zimmerman is Professor of Statistics and Actuarial Science and Department of Biostatistics at the University of Iowa. He received his Ph.D. in Statistics from Iowa State University in 1986. He is a Fellow of the American Statistical Association and the Institute for Mathematical Statistics. In 2007, he received the Distinguished Achievement Award from the Section on Statistics and the Environment of the American Statistical Association. His research interests include spatial statistics, longitudinal data analysis, multivariate analysis, mixed linear models, environmental statistics, and sports statistics. He has authored or co-authored five books and more than 90 articles in journals such as: Biometrics; Biometrika; Journal of the Royal Statistical Society (Series B); Applied Statistics; Test; Journal of Statistical Computation and Simulation; Journal of Statistical Planning and Inference; Journal of Computational and Graphical Statistics; Statistics in Medicine; Environmetrics; Journal of Agricultural, Biological, and Environmental Statistics; The American Statistician; Technometrics; Probability and Statistics Letters; and Mathematical Geology. At the University of Iowa, he teaches courses in spatial and environmental statistics, linear models, experimental design, and sports statistics. He has supervised the doctoral thesis research of 16 Ph.D. students. He has given 86 invited presentations and many more contributed presentations at conferences and universities.

Colloquium Access Information:

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In Person: AUST 202

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