Random Effects Modelling for Spatial Data

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XIN FENG, Simon Fraser University
An Overview of Random Effects Models for Spatial Analyses

The development of methods for spatial analyses has seen tremendous growth over the last two decades, with considerable impact on disease monitoring and on exploratory analyses to investigate etiology. This talk discusses spatial and spatial-temporal models with specific emphasis on accommodating the dependence across space and time through random effects in the error components. Such a specification provides insights in the spatio-temporal risk surface through the random effects. Spatial random effects models are also useful in the joint analysis of outcomes in mapping studies where shared random effects accommodate correlations in outcomes. A variety of studies will illustrate the methods.

RENJUN MA, University of New Brunswick
Tweedie Mixed Models for Spatiotemporal Data.

Massive data sets with complex spatiotemporal structures are common in forestry, health and environmental studies. In order to account for such spatiotemporal structures, we incorporate spatially and temporally correlated random effects into Tweedie generalized linear models, accommodating a wide range of discrete, continuous and semi-continuous data. The estimation of these models often poses theoretical and computational challenges. We propose a unified estimation method for these models based on orthodox best linear unbiased predictors of random effects. Our approach is illustrated with application to analysis of environmental data.

GARY SNEDDON, Mount Saint Vincent University
Analysis of Cross-Classified Spatial Data

Our work is motivated by analysis of hospital admission data where patients are cross-classified by their residential areas and general practices. Patient outcomes tend to be correlated within geographical areas and general practices; however, the clustering effects are cross-classified rather than hierarchical. In addition, patient outcomes might be spatially correlated among geographical areas. In this study, we incorporate crossed random effects of geographical areas and general practices into Poisson models. We also consider spatial correlation among effects of geographical areas. An orthodox best linear unbiased predictor approach has been developed in the estimation of our model.