

Robust Estimation of a Multilevel Model with Structural Change

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Abstract: A generalized spatiotemporal multilevel model is postulated and estimated using the backfitting algorithm imbedded with forward search algorithm and maximum likelihood estimation. The forward search algorithm ensures robustness of the estimates, filtering the effect of the temporary structural changes in the estimation of the group-level covariate parameters, the individual-level covariate and the spatial parameters. Backfitting algorithm provides computational efficiency of the estimation procedure assuming an additive model. Using simulation studies, the estimated model is shown to be capable of producing robust estimates even in the presence of structural changes induced for example by temporary epidemic outbreak. The model also produced robust estimates even for small sample sizes and short time series common in epidemiological setting.

Keywords: *multilevel model, spatiotemporal model, robust method, forward search algorithm*