Robust Estimation of a Dynamic Spatio-temporal Model with Structural Change

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ABSTRACT

We postulate a dynamic spatio-temporal model assuming constant covariate effect but with varying spatial effect over time and varying temporal effect across locations. We proposed a backfitting algorithm embedded with forward search algorithm and bootstrap to generate robust estimates of the parameters in the event of a temporary structural change. A simulation study is designed to account for various scenarios. The mean absolute prediction errors (MAPE) under the proposed algorithm are smaller than with ordinary linear model, this is especially true when there are more spatial units than time points. The proposed algorithm also produced lower relative bias and standard errors for the spatial parameter estimates. The relative bias also declines when there are more neighborhoods. Predictive ability of the models deteriorates when structural change happened in the more recent periods.

Keywords: spatio-temporal model, backfitting algorithm, bootstrap, forward search, dynamic model