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Using Stratified Sums of Martingale Residuals to Assess the Goodness of Fit of Relational Event Models

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Dynamic networks arise from a set of players exchanging temporally ordered interactions. The past configurations of the networks may impact the future ones. The relational event model (REM) entails deepening the underlying dynamics that make the system's players engage each other. Yet, an open-research field concerns the evaluation of the goodness of fit (GOF) of this model, especially when it incorporates time-varying and random effects as well.

We consider a smooth mixed-effect REM estimated via case-control sampling and we propose a cumulative martingale-residual-based approach. We may derive various GOF statistics. For instance, if the model is adequate, the receiver-specific normalized sum of martingale residuals can be shown to behave as a standard normal asymptotically.

We present an empirical application which entails explaining sequences of alien species invasions via smooth case-control REM. The first year a species is detected as alien in a region where it was not native represents our time-stamped relational event of interest. To assess the GOF, we stratify martingale residuals by country. With a significance level of 5 %, no misspecification related to the regions is highlighted.

Different stratification strategies may be applied to martingale residuals, to inspect whether the relevant network dynamics features have been adequately incorporated into the model.

Keywords

relational event models, time-varying effects, random effects, goodness of fit, alien species invasions

Topics

- Temporal networks, network dynamics and evolution patterns

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