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Semi-parametric spatio-temporal varying coefficient model in matched case-crossover studies

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In matched case-crossover studies, it is generally accepted that the covariates on which a case and associated controls are matched cannot exert a confounding effect on independent predictors included in the conditional logistic regression model. The conditional logistic regression model is not able to detect any effects associated with the matching covariates by stratum, such as time and spatial location. We propose an approach which allows us to simultaneously evaluate the following three features:

1. Detect the parametric relationship between the predictor and binary outcomes,

2. Evaluate semi-parametric relationships between the predictor and time, and

3. Determine whether there is an effect modification due to spatial location for a reduced number of locations.

We demonstrate the accuracy of the estimation using simulation studies and an epidemiological example of a 1-4 bi-directional case-crossover study of childhood aseptic meningitis with drinking water turbidity.

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Notes:

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Page 96