Spatial-temporal model for count data

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In epidemiology, disease mapping using count data is a very important issue. Under a Poisson-lognormal model, we develop a spatial-temporal process. The log transformation of the conditional expected number of cases is decomposed as a linear combination of basis functions and a stationary process. The problem of mean and covariance estimations can be considered as a regression. A subset selection method of Lasso and group Lasso are used to choose a suitable subset of the basis functions and estimate the mean and covariances. This method can characterize either non-stationary or nearly stationary spatial processes, and is computationally efficient for large data sets.

**keywords:** Poisson-lognormal model, Spatial-temporal process, Disease maps, Lasso, group Lasso