

Spatio-temporal Modeling of Hantavirus in Germany

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Abstract

In this master thesis several spatio-temporal models are being fitted to the spatio-temporal occurrence of hantavirus in Germany. Hantavirus is an infectious disease transmitted by bank voles. The relationship between several covariates related to the number of bank voles and the disease incidence is explored. These covariates include forest area, fructification of trees and proximity between urban and forest areas. The inference is carried out in a Bayesian framework and the data is modeled as a generalized additive model to include spatial effects. The INLA method as presented by Rue et al. (2009) is explained in depth and a general summary of the necessary background material is given. Model fitting is carried out with the R-package R-INLA. We find evidence for our hypothesis that a high fructification increases the hantavirus case numbers in the following year. A high fructification of trees means an abundance of food for bank voles and as such larger case numbers can be expected. Data and models are visualized and the models are checked for adequacy.

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