A space-time multivariate Bayesian model to analyse road traffic accidents by severity

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The paper investigates the dependences between levels of severity of road traffic accidents, accounting at the same time for spatial and temporal correlations. The study analyses road traffic accidents data at ward level in England over the period 2005-2013. We include in our model multivariate spatially structured and unstructured effects to capture the dependences between severities, within a Bayesian hierarchical formulation. We also include a temporal component to capture the time effects and we carry out an extensive model comparison. The results show important associations in both spatially structured and unstructured effects between severities, and a downward temporal trend is observed for low and high levels of severity. Maps of posterior accident rates indicate elevated risk within big cities for accidents of low severity and in suburban areas in the north and on the southern coast of England for accidents of high severity. The posterior probability of extreme rates is used to suggest the presence of hot spots in a public health perspective.
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