Ann Inst Stat Math (2011) 63:1103–1122
DOI 10.1007/s10463-010-0284-7

Testing separability in marked multidimensional point processes with covariates

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Received: 1 August 2008 / Revised: 30 March 2009 / Published online: 2 June 2010

Abstract In modeling marked point processes, it is convenient to assume a separable or multiplicative form for the conditional intensity, as this assumption typically allows one to estimate each component of the model individually. Tests have been proposed in the simple marked point process case, to investigate whether the mark distribution is separable from the spatial–temporal characteristics of the point process. Here, we extend these tests to the case of a marked point process with covariates, and where one is interested in testing the separability of each of the covariates, as well as the mark and the coordinates of the point process. The extension is not at all trivial, and covariates must be treated in a fundamentally different way than marks and coordinates of the process, especially when the covariates are not uniformly distributed. An application is given to point process models for forecasting wildfire hazard in Los Angeles County, California, and solutions are proposed to the problem of how to proceed when the separability hypothesis is rejected.

Keywords Conditional intensity · Covariates · Marked point processes · Separability · Testing · Wildfires