



---

**Consistent kernel intensity estimation for inhomogeneous point processes. Application to the analysis of wildfires registered in Galicia (NW Spain).**

Wenceslao González-Manteiga

University of Santiago de Compostela, Santiago de Compostela, Spain - wenceslao.gonzalez@usc.es

María Isabel Borrajo

University of Santiago de Compostela, Santiago de Compostela, Spain - mariaisabel.borrajo@usc.es

Isabel Fuentes-Santos

Instituto de Investigaciones Marinas CSIC, Vigo, Spain - isabel.fuentes@usc.es

Spatial point patterns arise in a wide variety of scientific contexts, including seismology, forestry, geography and epidemiology. Wildfire is the most ubiquitous natural disturbance in the world and represents a problem of considerable social and environmental importance; particularly, in Galicia (NW Spain) arson fires are the main cause of forest destruction. Knowing the spatial distribution of forest fires would be a key factor for future development of fire prevention and fire fighting plans. Nonparametric estimation and bootstrap techniques play an important role in many areas of Statistics. In the point process framework, kernel intensity estimation has been limited to exploratory analysis due to its lack of consistency. This work addresses different procedures to obtain a consistent estimator of the first order intensity such as kernel estimation of the density of event locations and kernel intensity estimation based on covariates. We propose a smooth bootstrap procedure for inhomogeneous point processes in order to develop effective bandwidth selectors for kernel intensity estimation. Finally, the consistent estimators introduced above, were used to estimate the first order intensity of the wildfires registered in Galicia during the period 1999-2008.

**Keywords:** bandwidth selection; first order intensity; inhomogeneous point processes; wildfires.