Statistical analysis of functional marked point processes

Mohammad Ghorbani

Department of mathematics and mathematical statistics, Umeå University

Abstract

This paper defines the class of functional marked point processes, where to each point of the point processes are attached random elements which take values in some Polish function space such as Skorohod space or Lp space. We generalize notions of marked point processes and indicate how this class, in a sensible way, connects the point process framework with the functional data analysis framework. We also show how to construct different classes of these models by choosing specific functional mark structures, and how càdlàg functional marked Cox processes have a double connection to random fields. We further define characteristics such as product densities, Palm distributions and marked inhomogeneous k-functional in order to develop statistical inference tools for analyzing functional marked point patterns.

Keywords: Càdlàg stochastic process, Constructed functional marks, Correlation functional, Functional marked point process, Functional mark distribution, Geostatistical prediction with locations error, Intensity functional, Marked inhomogeneous K-functional, Marked reduced Palm measure, Spatio-temporal geostatistical marking, Wiener measure.