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## FUNCTIONAL PRINCIPAL COMPONENT ANALYSIS OF SPATIALLY AND TEMPORALLY INDEXED POINT PROCESSES

### ABSTRACT:

We model spatially and temporally indexed point process data as a multi-level log-Gaussian Cox process where the log intensity function depends on a partially linear single-index structure of spatio-temporal covariates and three latent functional random effects representing the spatial and temporal random effects as well as their interactions. We assume that the latent functional effects are Gaussian processes with Karhunen-Loeve representations, and model the unknown link function of the single-index as well as the covariance functions of the latent functional effects as splines. We propose to estimate the partially linear coefficients and the single-index link function using a Poisson maximum likelihood method, and the covariance functions of the latent processes using maximum composite likelihood methods. We also propose approaches to predict the functional principal component scores. Under the multi-level dependence structure and allowing the spatio-temporal covariates to be non-stationary, the proposed estimators follow rather unconventional convergence rates which depend on both the number of locations and the number of repeated measures in time. We illustrate the proposed method through a simulation study and a real-data application in modeling bike-sharing events.

*BIO: Yehua Li is Professor & Chair of Statistics, the University of California at Riverside. He received his Ph.D. in Statistics in 2006 from Texas A&M University under Raymond Carroll and Tailen Hsing. Before joining UCR in 2018, he held faculty positions in the University of Georgia and Iowa State University. He is a Fellow of the American Statistical Association, Fellow of the Institute of Mathematical Statistics, Elected Member of the International Statistical Institute, and a recipient of the National Science Foundation CAREER Award in 2012. He has served on the editorial boards of Canadian Journal of Statistics, Journal of Multivariate Analysis and Stat. His research interests include functional and longitudinal data analysis, non- and semi-parametric methods, spatial statistics, measurement error and mixture models. He was also a recipient of the H. O. Hartley Award.*

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**11:00 AM - 12:00 PM, CST**

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