Fractals with point impact in functional linear regression

Ian McKeague
Department of Biostatistics
Mailman School of Public Health
Columbia University

This talk introduces a point impact linear regression model in which the trajectory of a continuous stochastic process, when evaluated at a "sensitive time point", is associated with a scalar response. The proposed model complements and is more interpretable than the functional linear regression approach that has become popular in recent years. The trajectories are assumed to have fractal (self-similar) properties in common with a fractional Brownian motion with an unknown Hurst exponent. Bootstrap confidence intervals based on the least-squares estimator of the sensitive time point are developed. Misspecification of the point impact model by a functional linear model is also investigated. Non-Gaussian limit distributions and rates of convergence determined by the Hurst exponent play an important role.