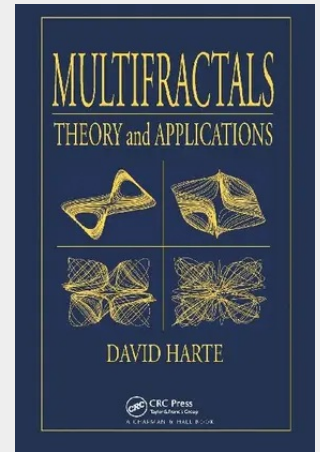


Multifractals

Theory and Applications

Although multifractals are rooted in probability, much of the related literature comes from the physics and mathematics arena. *Multifractals: Theory and Applications* pulls together ideas from both these areas using a language that makes them accessible and useful to statistical scientists. It provides a framework, in particular, for the evaluation of statistical properties of estimates of the Renyi fractal dimensions. The first section provides introductory material and different definitions of a multifractal measure. The author then examines some of the various constructions for describing multifractal measures. Building from the theory of large deviations, he focuses on constructions based on lattice coverings, covering by point-centered spheres, and cascades processes. The final section presents estimators of Renyi dimensions of integer order two and greater and discusses their properties. It also explores various applications of dimension estimation and provides a detailed case study of spatial point patterns of earthquake locations. Estimating fractal dimensions holds particular value in studies of nonlinear dynamical systems, time series, and spatial point patterns. With its careful yet practical blend of multifractals, estimation methods, and case studies, *Multifractals: Theory and Applications* provides a unique opportunity to explore the estimation methods from a statistical perspective.

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