



The University of Chicago

Department of Statistics

Seminar Series

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**MERLISE CLYDE**

Institute of Statistics and Decision Sciences  
Duke University

**“Nonparametric Function Estimation Using Overcomplete  
Representations and Levy Random Field Priors”**

**MONDAY November 14, 2005 at 4:00 PM**  
**133 Eckhart Hall, 5734 S. University Avenue**  
*Refreshments following the seminar in Eckhart 110.*

### **ABSTRACT**

We consider the problem of nonparametric function estimation using overcomplete dictionaries, where the function is modeled as a sum of dictionary elements with unknown coefficients. We consider overcomplete dictionaries generated by arbitrary translations (location) and rescaling of a basic generating function, such as a kernel or wavelet. The unknown locations, scales and coefficients in the stochastic expansion are modelled a priori thru a Levy random field, permitting tractable posterior simulation via a reversible jump Markov chain Monte Carlo algorithm. Efficient computation is possible because dictionary elements are only computed when needed, bypassing the need to invert large matrices. We discuss connections between this prior choice and other regularized likelihood approaches that generate sparse representations. We compare the performance of estimators using the Levy random field priors and translational invariant wavelets on simulated data using standard wavelet test functions. If time permits, applications to mass spectroscopy used in proteomics and multivariate spatial-temporal models for criteria pollutants will be presented.

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Please send email to Mathias Drton ([drton@galton.uchicago.edu](mailto:drton@galton.uchicago.edu)) for further information. Information about building access for persons with disabilities may be obtained in advance by calling the department office at (773) 702-8333.