

**STANFORD UNIVERSITY**  
**DEPARTMENT OF STATISTICS**  
**DEPARTMENTAL SEMINAR**

4:15 p.m., Tuesday, July 17, 2007 Sequoia Hall Room 200  
(Cookies at 3:45 in 1st Floor Lounge)

*Haipeng Xing*  
Department of Statistics  
Columbia University

**A hidden Markov modeling approach to multiple change-points**

After a brief review of previous frequentist and Bayesian approaches to multiple change-points, we describe a hidden Markov modeling approach that has attractive computational and statistical properties. This approach yields explicit recursive filters and smoothers for estimating the piecewise constant parameters in multiparameter exponential families and generalized linear models, and efficient estimators of the hyperparameters of the hidden Markov model for the parameter jumps. Although the approach is Bayesian in nature, it can be used for frequentist problems such as significance testing of the null hypothesis of no change-points versus multiple change-point alternatives. It can also be used to partition the unknown parameter sequence into segments of equal values and to provide confidence assessment of the segmentation. Applications to array-CGH data analysis in genetic studies of cancer, change-point AR-GARCH modeling of econometric time series, and speech recognitions illustrate the versatility of the proposed methodology. Simulation studies and asymptotic theory of its performance are also given.