Stanford University
Department of Statistics

DEPARTMENTAL SEMINAR

4:15pm, Tuesday, July 17, 2012
Sequoia Hall Room 200
Cookies served at 3:45pm, 1st floor Lounge.

Speaker: Armin Schwartzman, Harvard School of Public Health

Title: Multiple Testing of Local Maxima for Detection of Peaks in 1D

Abstract:

A topological multiple testing scheme for one-dimensional domains is proposed where, rather than testing every spatial or temporal location for the presence of a signal, tests are performed only at the local maxima of the smoothed observed sequence. Assuming unimodal true peaks with finite support and Gaussian stationary ergodic noise, it is shown that the algorithm with Bonferroni or Benjamini-Hochberg correction provides asymptotic strong control of the family wise error rate and false discovery rate, and is power consistent, as the search space and the signal strength get large, where the search space may grow exponentially faster than the signal strength. Simulations show that error levels are maintained for nonasymptotic conditions, and that power is maximized when the smoothing kernel is close in shape and bandwidth to the signal peaks, akin to the matched filter theorem in signal processing. The methods are illustrated in an analysis of electrical recordings of neuronal cell activity.