Boston University Statistics Seminar Series

Two problems from neural data analysis: sparse entropy estimation and adaptive experimental design

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Thursday, November 30, 2006, 4:00-5:00pm
Mathematics and Computer Science (MCS) Building, Room 149
111 Cummington Street, Boston

Tea and Cookies at 3:30pm in MCS 153

Abstract: Neuroscience has proven to be a rich source of interesting statistical questions. This talk will address two such problems:

1) Nonparametric estimation of information-theoretic quantities (especially the Shannon entropy and mutual information) from sparsely-sampled data. These quantities are nonlinear (in fact singular) functionals of the distribution from which the data were drawn; nevertheless, the entropy and information turn out to be strictly easier to estimate than the underlying distributions.

2) Optimal, adaptive experimental design (how do we select stimuli online to learn the most about the brain in the least amount of time?). We discuss an asymptotic result that quantifies the benefit of adaptive versus nonadaptive designs, and describe numerical work in progress on computing the optimal design very quickly, in the context of real-time neuroscience experiments (with J. Lewi, Georgia Inst. Tech.).

For directions and maps, please see *http://math.bu.edu/research/statistics/statseminar.html*