Semester: Fall 2005  
Location: Bloch School, Room 3 (Just west of Linda Hall Library)  
Day & Time: Thursday, 1:00-1:45 pm

Organizer: Yong Zeng, 235-5850  
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Dates, Titles, Speakers (with Abstracts as available)

Thursday Sept. 22  
On the reciprocal difference equation with maximum  
Hristo Voulov

We study a recurrence relation where the next term is the maximum of the reciprocals of two preceding terms with period two coefficients. Simple explicit conditions on the coefficients determine when all positive solutions are bounded and periodic with the same period.

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Thursday Oct. 6  
Perturbation Theory for Positive Definite Matrices  
Noah Rhee

We discuss the standard and the newer perturbation theory for eigenvalues of symmetric positive definite matrices.

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Thursday Oct. 22  
A Statistical Model for the Gene Expression Data  
Jie Chen

In this talk, we will study patterns of some gene expression datasets resulting from high-throughput biological experiments. Then, we will propose a model to characterize the gene expression data. Properties of the proposed model will be studied as well.

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A Bayesian Model of Sequential Test Allocation for Software Reliability Estimation
Kamel Rekab

In any non-trivial software system, reliability cannot be determined exactly. Instead, we must apply statistical methods to create an estimate based on a sample of test cases. Our goal is, given a fixed total number of test cases, to determine how to allocate these test cases among partitions of the software so as to minimize the expected loss incurred by the Bayes estimator of the overall reliability.

In contrast to fixed sampling schemes, where the proportion of test cases taken from each partition is determined before reliability testing begins, we make allocation decisions dynamically throughout the testing process. Using a fully Bayesian approach we can take advantage of information from previous functional testing and insights from developers. We then refine these estimates in an iterative manner as we sample.

Here we compare the results from purely sequential, multistage and accelerated sampling schemes and demonstrate their superiority over the optimal fixed sampling scheme in terms of the expected loss incurred when the overall reliability is estimated by its Bayes estimator both theoretically and through Monte Carlo simulations.

Filtering with Marked Point Process Observations: Applications to the Econometrics of Ultra-High Frequency Data
Yong Zeng

Ultra-high frequency (UHF) (or transaction) data are naturally modeled as a marked point process (MPP). In this talk, we present a general filtering model for UHF data. The statistical foundations and their related filtering equations are studied. Two general approaches for constructing efficient algorithms will be discussed. One approach is the Markov chain approximation method, and the other is Sequential Monte Carlo method or particle filtering method. Some convergence theorems for consistent, efficient algorithms are established. Simulation examples and applications to real tick-by-tick financial data are provided.