Department of Applied and Computational Mathematics and Statistics Colloquium

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will give a lecture entitled:

On Bayesian treed Gaussian process extensions for large spatial datasets and multiple outputs

Abstract

Gaussian process models have been widely used in spatial statistics but face tremendous modeling and computational challenges for very large non-stationary spatial datasets. To address these challenges, we develop a Bayesian modeling approach that uses a non-stationary covariance function constructed based on adaptively selected partitions. To facilitate the computations in the posterior evaluation and global prediction, we use the full-scale covariance approximation (FSA). The overall approach can be described as an extension of the Bayesian treed Gaussian process (BTGP) which uses global covariance function and reduces the computational cost by using approximation techniques (such as FSA). The proposed method is applied to the global Total Ozone Matrix Spectrometer (TOMS) dataset.

Gaussian process and BTGP are also widely used in computer experiment (CE) problems to study and predict the behavior of complex systems. In these problems, the response often consists of a set of non-stationary outputs. To model the dependencies between the outputs and their nonstationarity behavior, we develop a Bayesian treed multivariate Gaussian process (BTMGP) as an extension of the BTGP. The computational cost of CE simulations at high resolution often is expensive and impractical for parametric studies. To increase the accuracy with limited resources, we propose a sequential design of experiment for the input space using the BTMGP. The method is applied in the CE problem of multiphase flow in a full scale regenerator of a carbon capture unit.

Monday, February 3, 2014
4:30 p.m. to 5:30 p.m.
127 Hayes-Healy Center

Colloquium Tea **4:00 p.m. to 4:30 p.m.** **154 Hurley Hall**