Modeling Covariance Functions and Spheres

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Abstract:
Spatial analysis of large data sets on spheres have drawn more attention recently. To better quantify the uncertainty in spatial prediction and estimation, it is often necessary to have a good estimate of the covariance structure of the underlying process. Conventional full likelihood approaches require full specification of parametric models and face the computational obstacle of getting the inverse and determinant of covariance matrix. Alternatively, nonparametric methods which do not require subjectively specifying a parametric covariance function can be utilized. A valid covariance function on spheres can be written as a constrained expansion of Legendre polynomials. However, the truncation of the expansion introduces too much smoothness. We propose to add a tapered Matern covariance function to capture the local behavior while the nonparametric expansion controls the behavior at large distances. A model selection procedure based on residual sum of squares with penalization is used to reduce over fitting. Simulation studies show that our method greatly improves the kriging performance. Our new method is then applied to the Total Ozone Mapping Spectrometer data which are observed over the entire globe. Additionally, a kernel-convolution based approach to model nonstationary random field will also be discussed.

Yang is a candidate for a faculty position in our department.

Tuesday, February 26, 2013
4:00 pm
Refreshments will be provided at 3:45.
Solon Campus Center 130
EVERYONE IS WELCOME

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