Colloquium

Dr. Christopher K. Wikle

University of Missouri

Friday October 18th
Room 608, 2925 Campus Green Drive
4:00 – 5:00 pm

Simplifying Statistical Dynamic Spatio-Temporal Models via Deep-Model Generated Basis Functions

Spatio-temporal data are ubiquitous in the sciences and engineering, and their study is important for understanding and predicting a wide variety of processes. One of the difficulties with statistical modeling of spatial processes that change in time is the complexity of the dependence structures that must describe how such a process varies, and the presence of high-dimensional complex datasets and large prediction domains. It is particularly challenging to specify parameterizations for nonlinear dynamic spatio-temporal models (DSTMs) that are simultaneously useful scientifically, efficient computationally, and allow for proper uncertainty quantification. Here we utilize reservoir computing, via deep echo-state network models, to generate multi-scale basis functions for nonlinear DSTMs. The requisite basis function expansion with random coefficients allows the conditional mean to be considered as a high-dimensional linear process for Gaussian or non-Gaussian data.   Importantly, the complex nonlinear spatio-temporal dynamics of the process can be captured in the construction of the deep-model generated basis functions. The approach is illustrated with examples applied to environmental and ecological data.

Refreshments will be served 3:00 – 3:30 pm in the Faculty & Graduate Student Lounge Room 4118 French Hall West

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