Tuesday 01.02 09h00 - 10h30 Tomas Masak

Title: Random Surface Covariance Estimation by Shifted Partial Tracing

Abstract: The problem of covariance estimation for replicated surface-valued processes is examined from the functional data analysis perspective. Considerations of statistical and computational efficiency often compel the use of separability of the covariance, even though the assumption may fail in practice. We consider a setting where the covariance structure may fail to be separable locally -- either due to noise contamination or due to the presence of a~non-separable short-range dependent signal component. That is, the covariance is an additive perturbation of a separable component by a~non-separable but banded component. We introduce non-parametric estimators hinging on the novel concept of shifted partial tracing, enabling computationally efficient estimation of the model under dense observation. Due to the denoising properties of shifted partial tracing, our methods are shown to yield consistent estimators even under noisy discrete observation, without the need for smoothing. Moreover, the calculation and subsequent manipulation (such as inversion, required for prediction) of our estimators comes at no computational overhead relative to a separable model. Finally, the proposed methodology is illustrated on a data set of mortality rate surfaces.