DSS Statistics Seminar
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https://uniroma1.zoom.us/j/86881977368?pwd=SWRFcVFjMDZTa0IXZk05TE1zNm5adz09
Passcode: 432940

Testing for the Rank of a Covariance Kernel

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How can we discern whether the covariance of a stochastic process is of reduced rank, and if so, what its precise rank is? And how can we do so at a given level of confidence? This question is central to a great deal of methods for functional data, which require low-dimensional representations whether by functional PCA or other methods. The difficulty is that the determination is to be made on the basis of i.i.d. replications of the process observed discretely and with measurement error contamination. This adds a ridge to the empirical covariance, obfuscating the underlying dimension. We describe a matrix-completion inspired test statistic that circumvents this issue by measuring the best possible least square fit of the empirical covariance's off-diagonal elements, optimised over covariances of given finite rank. For a fixed grid of sufficiently large size, we determine the statistic's asymptotic null distribution as the number of replications grows. We then use it to construct a bootstrap implementation of a stepwise testing procedure controlling the family-wise error rate corresponding to the collection of hypotheses formalising the question at hand. Under minimal regularity assumptions we prove that the procedure is consistent and that its bootstrap implementation is valid. The procedure circumvents smoothing and associated smoothing parameters, is indifferent to measurement error heteroskedasticity, and does not assume a low-noise regime. Based on joint work with Anirvan Chakraborty.

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