Vortragsankündigung

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Titel: Efficiency of change point tests in high-dimensional settings

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Abstract:

While there is considerable work on change point analysis in univariate time series, more and more data being collected comes from high dimensional multivariate settings. In this talk we introduce the asymptotic concept of high dimensional efficiency which quantifies the detection power of different statistics in such situations. While being related to classic asymptotic relative efficiency, it is different in that it provides the rate at which the change can get smaller with dimension while still being detectable. This also allows for comparisons of different methods with different null asymptotics as is for example the case in high-dimensional change point settings.
Based on this new concept we investigate change point detection procedures using projections and develop asymptotic theory for how full panel (multivariate) tests compare with both oracle and random projections. Furthermore, for each given projection we can quantify a cone such that the corresponding projection statistic yields better power behavior if the true change direction is within this cone.
The effect of misspecification of the covariance on the power of the tests is investigated, because in many high dimensional situations estimation of the full dependency (covariance) between the multivariate observations in the panel is often either computationally or even theoretically infeasible. It turns out that the projection statistic is much more robust in this respect in terms of size and somewhat more robust in terms of power. The theoretic quantification by the theory is accompanied by simulation results which confirm the theoretic (asymptotic) findings for surprisingly small sample sizes. This shows in particular that the concept of high dimensional efficiency is indeed suitable to describe small sample power.

This is joint work with John Aston (University of Cambridge).