Mathematics and CS Seminar

Limit theorems for the largest eigenvalues of the sample covariance matrix of a heavy-tailed time series

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We study the joint distributional convergence of the largest eigenvalues of the sample covariance matrix of a p-dimensional heavy-tailed time series when p converges to infinity together with the sample size n. We generalize the growth rates of p existing in the literature. Assuming a regular variation condition with tail index alpha<4, we employ a large deviations approach to show that the extreme eigenvalues are essentially determined by the extreme order statistics from an array of iid random variables. The asymptotic behavior of the extreme eigenvalues is then derived routinely from classical extreme value theory. The resulting approximations are strikingly simple considering the high dimension of the problem at hand.

We develop a theory for the point process of the normalized eigenvalues of the sample covariance matrix in the case where rows and columns of the data are linearly dependent. Based on the weak convergence of this point process we derive the limit laws of various functionals of the eigenvalues.

This talk is based on a joint work with Richard Davis and Thomas Mikosch.

Tuesday, March 7, 2017 04:00pm - 06:00pm
Seminar room Big Ground floor / Office Bldg West (I21.EG.101)

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