Séminaire de Probabilités et Statistique

Mardi 05 Février à 14h00
Laboratoire Dieudonné
Salle de conférence - LJAD

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Statistical thresholds for low-rank tensor estimation
Joint work with Aukosh Jagannath and Patrick Lopatto

We study the statistical limits of testing and estimation of a rank-one tensor (that represents some signal) perturbed by Gaussian noise, in the high-dimensional limit. We consider two main questions :
— Is it possible to test if the observed tensor contains some signal, or is it made of pure noise ?
— Can we estimate the signal ?
Depending on the noise level, the answer can be positive or negative. We compute here the critical value of the noise variance for hypothesis testing and for estimation by maximum likelihood and show that they are the same. Furthermore, we find that the maximum likelihood estimator achieves the maximal correlation with the planted vector among all estimators. In this setting, the maximum likelihood estimator exhibits a discontinuous BBP-type transition : below the critical threshold the estimator is orthogonal to the planted vector, but above the critical threshold, it achieves positive correlation which is uniformly bounded away from zero.