CONCENTRATION OF THE EMPIRICAL SPECTRAL DISTRIBUTION OF RANDOM MATRICES WITH DEPENDENT ENTRIES

BARTŁOMIEJ POLACZYK

We investigate concentration properties of spectral measures of Hermitian random matrices with partially dependent entries. More precisely, let X_n be a Hermitian random matrix of the size $n \times n$ that can be split into independent blocks of the size at most $d_n = o(n^2)$. We prove that under some mild conditions on the distribution of the entries of X_n, the empirical spectral measure $L_n^{\frac{1}{\sqrt{n}}X_n}$ of $\frac{1}{\sqrt{n}}X_n$ concentrates around its mean, i.e.

$$\rho(L_n^{\frac{1}{\sqrt{n}}X_n}, \mathbb{E}L_n^{\frac{1}{\sqrt{n}}X_n}) \to_{\mathbb{P}} 0,$$

where ρ is any metric that metrizes weak convergence of probability measures.

As an immediate consequence we obtain that convergence in expectation implies convergence in probability of empirical spectral distribution of matrices that satisfy our assumptions.

References

[1] Polaczyk, Bartłomiej, *Concentration of the empirical spectral distribution of random matrices with dependent entries*. arXiv preprint arXiv:1809.05393, 2018.