INDIAN STATISTICAL INSTITUTE

Theoretical Statistics and Mathematics Unit, Kolkata

Thesis Pre-submission Seminar

Date: December 16, 2022, Friday
Time: 4:15 PM

Venue: L-infinity (5th Floor, A.N. Kolmogorov Bhavan)
Stat-Math Unit, ISI Kolkata

TITLE:

LIMITING SPECTRAL DISTRIBUTION OF SOME PATTERNED MATRICES WITH INDEPENDENT ENTRIES

SPEAKER:

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ABSTRACT:

The scaled standard Wigner matrix and its limiting eigenvalue distribution, namely the semi-circular distribution, has attracted much attention. The $2k$th moment of the limit equals the number of non-crossing pair-partitions of the set $\{1, 2, \ldots, 2k\}$. There are several extensions of this result in the literature.

Patterned random matrices such as the reverse circulant, the symmetric circulant, the Toeplitz and the Hankel matrices and their almost sure limiting spectral distribution (LSD), have also been studied quite extensively. Under the assumption that the entries are taken from an i.i.d. sequence with finite variance, the LSD are tied together by a common thread—the $2k$th moment of the limit equals a weighted sum over different types of pair-partitions of the set $\{1, 2, \ldots, 2k\}$ and are universal. Some results are also known for the sparse case.

We discuss extension of these results by relaxing significantly the i.i.d. assumption. With suitable assumption on the entries, the limits are defined via a larger class of partitions and are also not universal. In the process we show how some new sets of partitions gain importance in finding the moments of the limits.

Several existing and new results for Wigner and other patterned matrices, their band and sparse versions, as well as for matrices with continuous and discrete variance profile follow as special cases.

We also look into similar generalisation of existing results for XX^T matrices with independent entries that satisfy certain moment conditions. In this case too, some new results are generated besides obtaining the existing results as special cases.

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