

Large deviations of maximal and minimal eigenvalues of sample covariance matrices

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Abstract

We consider a sample covariance matrix in the form $\mathbf{X}\mathbf{X}^T/n$, where \mathbf{X} is a $p \times n$ random matrix whose entries are independent and identically distributed real sub-Gaussian random variables with zero mean and unit variance. Large deviations of the maximal and minimal eigenvalues (together with the condition number) of $\mathbf{X}\mathbf{X}^T/n$ are discussed in this talk, under the assumption that both the dimension size p and the sample size n tend to infinity with $p(n) = o(n)$. This study generalizes one result obtained in [1] and [2].

Keywords

Large deviations, Sample covariance matrices, Extremal eigenvalues, Condition numbers.

References

- [1] Fey, A., R. van der Hofstad and M. Klok (2008). Large deviations for eigenvalues of sample covariance matrices, with applications to mobile communication systems. *Adv. in Appl. Probab.* **40** 1048–1071.
- [2] Jiang, T. and D. Li (2015). Approximation of rectangular beta-Laguerre ensembles and large deviations. *J. Theoret. Probab.* **28** 804–847.