

Asymptotic spectral analysis of matrix quadratic forms

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Abstract

The asymptotic spectral distribution of a sum of matrix quadratic forms

$$Q = AA' + \sum_{i=1}^k \frac{1}{n} X_i X_i',$$

where A is non-random and $X \sim N_{p,n}(0, \Sigma, \Psi)$, p and n are, respectively, the number of variables and observations, and $\frac{p}{n} \rightarrow c > 0$ will be discussed. Early results of Marchenko and Pastur will be related to theorems of Girko and von Rosen ([2]), and Silverstein and Bai ([3]). Then, after a short introduction to free-probability theory and justification of free-independence of the quadratic forms, results regarding the use of the R-transform for asymptotic spectral analysis of Q will be presented.

Keywords

Asymptotic distribution, Distribution function of eigenvalues, Random matrix, Matrix quadratic form, R-transform, Stieltjes transform, Free-probability.

References

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