On projection of a positive definite matrix on a cone of non-negative definite Toeplitz matrices

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Abstract

For a given space of Toeplitz matrices, the aim of this paper is to find the projection of a given positive definite matrix on the cone of non-negative definite Toeplitz matrices. [1] claims that such projection is equivalent to the projection on linear space of Toeplitz matrices. We show that not all projections preserve non-negative definiteness. Solution of that problem is projection on a cone of non-negative definite Toeplitz matrices; cf. [2]

In this talk we give methodology and the algorithm of the projection. We base on the properties of a cone of non-negative definite Toeplitz matrices.

This problem can be applied in statistics, for example in the estimation of unknown covariance structures under the multi-level multivariate models; cf. [1].

References

[1] Cui, X., C. Li, J. Zhao, L. Zeng, D. Zhang, and J. Pan (2016). Covariance structure regularization via Frobenius norm discrepancy. *Linear Algebra Appl. 510*, 124–145.

[2] Ingram, J.M. and M.M. Marsh (1991). Projection onto convex cones in Hilbert space. *J. Approx. Theory 64*, 343–350.