

Multivariate Gaussians, semidefinite matrix completion, and convex algebraic geometry

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Abstract We study multivariate normal models that are described by linear constraints on the inverse of the covariance matrix. Maximum likelihood estimation for such models leads to the problem of maximizing the determinant function over a spectrahedron, and to the problem of characterizing the image of the positive definite cone under an arbitrary linear projection. These problems at the interface of statistics and optimization are here examined from the perspective of convex algebraic geometry.

Keywords Convex algebraic geometry · Multivariate normal distribution · Maximum likelihood estimation · Semidefinite matrix completion · Dual convex cone · Dual projective variety