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Rational and real positive semidefinite rank can be different. (English) Zbl 1408.15016
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Summary: Given a $p \times q$ nonnegative matrix M , the psd rank of M is the smallest integer k such that there exist $k \times k$ real symmetric positive semidefinite matrices A_1, \dots, A_p and B_1, \dots, B_q such that $M_{ij} = \langle A_i, B_j \rangle$ for $i = 1, \dots, p$ and $j = 1, \dots, q$. When the entries of M are rational it is natural to consider the rational-restricted psd rank of M , where the factors A_i and B_j are required to have rational entries. It is clear that the rational-restricted psd rank is always an upper bound to the usual psd rank. We show that this inequality may be strict by exhibiting a matrix with psd rank four whose rational-restricted psd rank is strictly greater than four.

MSC:

15B48 Positive matrices and their generalizations; cones of matrices

Cited in 4 Documents

Keywords:

matrix factorization; positive semidefinite rank; semidefinite programming

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