Calculation of Equilibrants for Semipositive Matrices

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Field: Applied Mathematics, Degree: M.S.

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Abstract

Our primary goal is to develop theory from which each may be calculated. For this end, the collection of semipositive matrices is partitioned into three subclasses for each equilibrant: (1) nonnegative matrices and (2) those that have some negative entries.

We break the nonnegative matrices down further into (1i) those that are positive diagonally equivalent to DS-matrices and (1ii) those that are not. A connection to those matrices that are scalable to doubly stochastic matrices is made. In the case of DS-scalable matrices, the “inf” in the definition of $e(A)$ is attained. For the invertible SP matrices which their inverses are DS-scalable matrices, the “sup” in the definition of $E(A)$ is attained. Some consequence of results are stated. In the process a certain matrix/vector equation $x^{(-1)} = A^T(Ax)^{(-1)}$ that is related to scalability of a matrix to one with line sums 1 is derived and discussed.