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Maximization of Correlation under a Quadratic Constraint

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Abstract: An algebraic method is suggested to search for the optimal solution that maximizes a correlation criterion under a quadratic constraint. First it is shown that the problem formulated in a sample space can be reformulated in a parameter space, and then some properties of a matrix which specifies the quadratic constraint are provided along with its geometrical interpretation; the solution can be obtained by solving a nonlinear equation derived from the singular value decomposition of the matrix. Numerical results based on artificial data and entrance examination data are given to examine how our solution differs from the least squares solution under a quadratic constraint.

Key words: canonical correlation, correlation coefficient, nonlinear optimization, quadratic constraint, singular value decomposition

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