A Branch and Reduce Approach for Solving Nonconvex Quadratic Programming Problems with Quadratic Constraints *

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Abstract: The paper presents a branch and reduce approach for solving nonconvex quadratic programming problems with quadratic constraints, which organically combines outer approximation method with branch and bound scheme. In the proposed algorithm, we propose a new linear programming relaxation to determine a low bound of the global optimal value for the original problem over each rectangle, and give a rectangle two-level partition method to deeply partition for each rectangle, and use reducing and deleting techniques on a rectangle to accelerate the convergence of the proposed algorithm. Under the assumption that the feasible point of the original problem is known, the proposed algorithm guarantees an ϵ-approximate optimal solution in finite number of iterations. We show with a numerical example that the proposed algorithm is efficient .

Keywords: nonconvex quadratic programming; quadratic constraints; global optimization; branch and reduce method; outer approximation method; two-level partition technique.

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