

Geometric Properties and Optimality Conditions of Quadratic Binary Programming

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Abstract: We explore in this paper certain rich geometric properties hidden behind quadratic 0-1 programming. Especially, we derive new lower bounding methods and variable fixation techniques for quadratic 0-1 optimization problems by investigating geometric features of the ellipse contour of a (perturbed) convex quadratic function. These findings further lead to some new optimality conditions for quadratic 0-1 programming. Integrating these novel solution schemes into a proposed solution algorithm of a branch-and-bound type, we obtain promising preliminary computational results.

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