A hybrid branch-and-bound(BB)/convex-cut-function(CCF) method to solve general NLP problems

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In this paper, the deterministic global optimization method which is applicable to general NLPs composed of twice differentiable objective and constraint functions. The proposed method combines BB algorithm and CCF. At the given subregion, continuous piecewise concave underestimator of objective function is generated to obtain upper and lower bound and CCF is generated for constraints when the acquired lower bound is located at infeasible region. Cutting region forms hyper-ellipsoid and acts one of the discarding conditions for the selected subregion. As the number of cutting region increases, the convergence speed decreases. To accelerate convergence speed, the inclusion relation between two hyper-ellipsoids should be applied. We show that the inclusion relation is determined by solving constrained NLP problem using Karush-Kuhn-Tucker condition. Using the inclusion relation between two hyper-ellipsoids, the hybrid BB/CCF shows good convergence for several NLP test problems.