

Optimality Conditions for General D.C. Constrained Problem

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We consider the general nonconvex problem with the goal function and equality and inequality constraints given by d.c. functions.

We reduce this problem to a problem without constraints by the exact penalty approach and present the penalized problem as a d.c. minimization one, i.e. with d.c. function which is nonsmooth. Furthermore, relations between the original problem and the penalized problem are investigated.

In addition, employing the d.c. structure of penalized problem the Global Optimality Conditions (GOCs) [1, 2] are developed and analysed. In particular, we prove that the GOCs possess the constructive property, i.e. when the GOCs are violated, it is possible to find a feasible (in original problem) vector which is better than the point under investigation.

Moreover, it is shown that the point satisfying the GOCs turns out to be a KKT vector in the original problem. It means, that the new GOCs are related to the Classical Optimization Theory.

Besides we establish that the verification of the GOCs consists in a solution of a family of the partially linearized (w.r.t. the basic nonconvexities of the original problem unified by the exact penalty in one function) problem, and consecutive verification of the principal inequality of the GOCs.

The effectiveness of the GOCs is verified by a number of examples in which the GOCs confirm its ability to escape stationary points and local minima with improving the goal function.

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References

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