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Binary classification via spherical separator by DC programming and DCA. (English)

Zbl 1275.90093
J. Glob. Optim. 56, No. 4, 1393-1407 (2013).

Summary: We consider a binary supervised classification problem, called spherical separation, that consists of finding, in the input space or in the feature space, a minimal volume sphere separating the set $\mathcal{A}$ from the set $\mathcal{B}$ (i.e., a sphere enclosing all points of $\mathcal{A}$ and no points of $\mathcal{B}$). The problem can be cast into the DC (difference of convex functions) programming framework and solved by DCA (DC algorithm) as shown in the works of *A. Astorino* et al. [J. Glob. Optim. 48, No. 4, 657–669 (2010; Zbl 1206.90120)]. The aim of this paper is to investigate more attractive DCA based algorithms for this problem. We consider a new optimization model and propose two interesting DCA schemes. In the first scheme, we have to solve a quadratic program at each iteration, while in the second one all calculations are explicit. Numerical simulations show the efficiency of our customized DCA with respect to the methods developed by Astorino et al. [loc. cit.].

MSC:

90C30 Nonlinear programming
90C90 Applications of mathematical programming

Keywords:

classification; spherical separation; DC programming; DCA

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