A Derivative-Free Trust-Region Algorithm for Composite Nonsmooth Optimization

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A derivative-free trust-region algorithm is proposed for minimizing the nonsmooth composite function $F(x) = h(f(x))$, where f is smooth and h is convex. This formulation includes problems of finding feasible points of nonlinear systems of inequalities (where $h(f) \equiv \|f^+\|_p$, with $f_i^+ = \max\{f_i, 0\}$ and $1 \le p \le +\infty$), finite minimax problems (where $h(f) \equiv \max_{1 \le i \le m} f_i$), and best L_1, L_2 and L_∞ approximation problems (where $h(f) \equiv \|f\|_p$, $p = 1, 2, \infty$). The algorithm combine ideas from Powell (1983), Yuan (1985) and Conn, Scheinberg and Vicente (2009). Under some conditions, global convergence results are given. Preliminary numerical tests indicate that the algorithm is promising.