Approximating Hessians in multilevel unconstrained optimization

V. Malmedy (FUNDP)

In Newton-like methods, computing Hessian or some dense approximation represents a serious obstacle to solve large-scale unconstrained optimization problems because of the still limited computation resources and memory capacities. Fortunately, these problems often have a partially separable structure. We present and compare several ways of obtaining Hessian approximations that take advantage of this property without requiring more than function and gradient evaluations. Some numerical experiences inside a recursive multilevel trust-region algorithm are also presented. A better integration in this framework is currently under investigation by trying to use information from approximate invariant subspaces and multisecant equations.