

Improved Hessian approximations with modified secant equations for symmetric rank-one method.

ABSTRACT

Symmetric rank-one (SR1) is one of the competitive formulas among the quasi-Newton (QN) methods. In this paper, we propose some modified SR1 updates based on the modified secant equations, which use both gradient and function information. Furthermore, to avoid the loss of positive definiteness and zero denominators of the new SR1 updates, we apply a restart procedure to this update. Three new algorithms are given to improve the Hessian approximation with modified secant equations for the SR1 method. Numerical results show that the proposed algorithms are very encouraging and the advantage of the proposed algorithms over the standard SR1 and BFGS updates is clearly observed.

Keyword: Hessian approximation; Secant equation; Symmetric rank-one update; Unconstrained minimization.