An adaptive sizing BFGS method for unconstrained optimization.

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Summary: In this paper, an adaptive sizing Broyden-Fletcher-Goldfarb-Shanno (BFGS) method for unconstrained optimization is proposed, whose scaling factor is automatically chosen by the signature of some terms of the approximate model’s curvature. The scaling factor is always chosen less than or equal to one as required by the convergence property of the self-scaling BFGS method of M. Al-Baali [Comput. Optim. Appl. 9, No. 2, 191–203 (1998; Zbl 0904.90127)], while the choosing strategy can ensure the sufficient positive definiteness of the updating matrices. Under mild conditions, the global convergence properties of Al-Baali [loc. cit.] on convex functions are proved. Numerical results on some test problems show the proposed method is competitive with its counterparts provided that the scaling factor is not too small.

Keywords: unconstrained optimization; secant equations; quasi-Newton methods; adaptive method; sizing Broyden-Fletcher-Goldfarb-Shanno (BFGS) method; scaling; convergence; numerical result
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