An alternative approach for finding Newton's direction in solving large-scale unconstrained optimization for problems with an arrowhead Hessian matrix

ABSTRACT

In this paper, we proposed an alternative way to find the Newton direction in solving large-scale unconstrained optimization problems where the Hessian of the Newton direction is an arrowhead matrix. The alternative approach is a two-point Explicit Group GaussSeidel (2EGGS) block iterative method. To check the validity of our proposed Newton's direction, we combined the Newton method with 2EGGS iteration for solving unconstrained optimization problems and compared it with a combination of the Newton method with Gauss-Seidel (GS) point iteration and the Newton method with Jacobi point iteration. The numerical experiments are carried out using three different artificial test problems with its Hessian in the form of an arrowhead matrix. In conclusion, the numerical results showed that our proposed method is more superior than the reference method in term of the number of inner iterations and the execution time.