

Newton-MSOR method for solving large-scale unconstrained optimization problems with an arrowhead Hessian matrices

ABSTRACT

Due to a large-scale problem, solving unconstrained optimization using classical Newton's method is typically expensive to store its Hessian matrix and solve its Newton direction. Therefore, in this paper, we proposed a NewtonMSOR method for solving large scale unconstrained optimization problems whose Hessian matrix is an arrowhead matrix to overcome these problems. This Newton-MSOR method is a combination of the Newton method and modified successive-over relaxation (MSOR) iterative method. Some test functions are provided to show the validity and applicability of the proposed method. In order to calculate the performance of the proposed method, combinations between the Newton method with Gauss-Seidel point iterative method and the Newton method with successive-over relaxation (SOR) point iterative method were used as reference methods. Finally, the numerical results show that our proposed method provides results that are more efficient compared to the reference methods in terms of execution time and a number of iterations.