

Diagonal Broyden-like Method for Large-scale Systems of Nonlinear Equations

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ABSTRACT

The prominent method for solving nonlinear equation is the classical Newton's method. Nevertheless the method is computational expensive, especially when handling large-scale systems, it requires more computation for storage of the Jacobian matrix, as well as solving a Newton's system at each iteration. In this paper, we continue the spirit of Newton method to develop an alternative approximation for the Newton step via diagonal updating. The anticipation behind our approach is to reduce the computational complexity of the classical Newton's method for solving large-scale systems of nonlinear equations. The convergence of the method proposed has been proven under standard assumptions. Numerical investigation into the effectiveness and consistency of the proposed scheme are given by numerical evaluation of some well-known benchmark nonlinear systems with some variants of Newton's method.

Keywords: Nonlinear equations, Diagonal Updating Large scale systems, Broyden's method.