On solving optimization problems for monotone nonlinear equations with applications on colon cancer

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This work proposes a family of hybrid conjugate gradient(CG) algorithms for solving system of constrained monotone nonlinear equations with an application to colon cancer. The proposed algorithms are convex combination of accelerated steepest descent direction and CG direction. The hybridization parameter is updated by utilizing the general quasi-Newton's direction. Furthermore, the family inherited some properties of modified β_k^{DY} , β_k^{HS} , & β_k^{LS} , CG parameters. Using proper assumptions, global convergence of the proposed algorithms are established. Finally, the numerical comparison of the proposed algorithms with reference to related existing algorithms demonstrates the efficiency of the new algorithms in terms of the number of iterations, function evaluation, and CPU time.

Keywords: Conjugate gradient algorithm, Constrained monotone system, Hybridization parameter, Quasi-Newton's direction, Colon cancer MSC2020: ... (optional)

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