

## Steepest Descent Method with New Step Sizes

**Authors :** Bib Paruhum Silalahi, Djihad Wungguli, Sugi Guritman

**Abstract :** Steepest descent method is a simple gradient method for optimization. This method has a slow convergence in heading to the optimal solution, which occurs because of the zigzag form of the steps. Barzilai and Borwein modified this algorithm so that it performs well for problems with large dimensions. Barzilai and Borwein method results have sparked a lot of research on the method of steepest descent, including alternate minimization gradient method and Yuan method. Inspired by previous works, we modified the step size of the steepest descent method. We then compare the modification results against the Barzilai and Borwein method, alternate minimization gradient method and Yuan method for quadratic function cases in terms of the iterations number and the running time. The average results indicate that the steepest descent method with the new step sizes provide good results for small dimensions and able to compete with the results of Barzilai and Borwein method and the alternate minimization gradient method for large dimensions. The new step sizes have faster convergence compared to the other methods, especially for cases with large dimensions.

**Keywords :** steepest descent, line search, iteration, running time, unconstrained optimization, convergence

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