

**THE INVESTIGATION OF GRADIENT METHOD NAMELY
STEEPEST DESCENT AND EXTENDING
OF BARZILAI BORWEIN FOR SOLVING UNCONSTRAINED
OPTIMIZATION PROBLEM**

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DECLARATION BY CANDIDATE

I certify that this report and the project to which it refers is the product of my own work and that any idea or quotation from the work of other people, published or otherwise are fully acknowledged in accordance with the standard referring practices of the discipline.

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ABSTRACT

Steepest Descent is one of the pioneers method in solving optimization problem since it is globally convergence. Even though it is globally convergence, the convergence rate is still slow. Thus, in this project we focusing more on SD method and its modification, to get the better convergence rate. This research is to investigate the behavior of gradient method namely Steepest Descent (SD), Barzilai Borwein 1(BB1), Barzilai Borwein 2(BB2) and Jaafar Mohamed(JM). This project is to analyse the performance of this four-method based on CPU time and number of iterations, and to show their global convergence. Eight test functions with several initial points from four geometrical quadrants has been chosen to test on SD, BB1, BB2 and JM method. The collected data is determined based on the number of iteration and CPU time by using exact line search. The results also show that all the methods possess global convergence. In order to analyse the best method geometrically, the performance profile by Dolan and Moore is used. Based on this performance profile, the best method will be determined. Lastly, numerical result will be generated from this research as a numerical prove to all the behaviour of the methods listed above.

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