THREE-TERM CONJUGATE GRADIENT USING STRONG WOLFE LINE SEARCH FOR ROBOTIC MOTION

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Thesis submitted in fulfilment of the requirement for
Bachelor of Science Mathematical Modelling and Analytics (Hons.)
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July 2024

ABSTRACT

Optimization involves with finding the optimal solution of the objective function. Conjugate gradient (CG) method is known as one of best the optimization method for solving unconstrained optimization problems. CG method is implemented in various application such as robotic motion, image restoration and regression analysis. CG is classified into few classifications such as scaled, three-term and hybrid CG methods. This research focuses on the performance of three term CG method (TTCG) under strong Wolfe line search and its applicability in robotic motion control. The performance of four TTCG methods, TTLAMR, TTRMIL, TTSMAR, and TTKMAR coefficients are tested using 15 standard test functions with different initial points and variables ranging from 2 to 10,000. The numerical results are computed based on number of iteration (NOI) and CPU time. These results are plotter using performance profile in order to evaluate its efficiency and robustness. Numerically, TTLAMR outperforms other methods by solving all test functions and it is followed by TTSMAR (99.38%), TTRMIL (97.84%), and TTKMAR (93.83%). Lastly, TTLAMR is implemented in robotic motion control. It shows that TTLAMR is able to effectively applied to the motion control of two joint planar robotic manipulators and the method has been applied to solve a practical problem of motion control

ACKNOWLEDGEMENT

Alhamdulillah, in the name of Allah, the Most Gracious and the Most Merciful, I express thanks to Allah for making this route easier for me to undertake to finish my report for the last year of studies. First and foremost, I would like to offer my heartfelt gratitude to my supervisor, Dr. Norhaslinda binti Zull Pakkal, for providing me with crucial support and direction during the whole of my study. Her guidance, which was both kind and knowledgeable, was helpful in ensuring that I ultimately finished the project successfully. A major component of the success of this study may be attributed to the constructive comments and ideas that she has provided. I would want to convey my deepest thanks to my parents and friends for the unconditional love and encouragement they have continually provided me with throughout every phase of my life. Finally, I would want to show my appreciation to every one of those around me who have provided me with the knowledge and abilities that are essential for completing a great report.

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