Pairwise Test Suite Generation Using Adaptive Teaching Learning-Based Optimization Algorithm with Remedial Operator

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ABSTRACT

Software systems nowadays have large configuration spaces. Pairwise test design technique is found useful by testers to sample only required configuration options of these systems for exploring errors owing to their interactions. Being a NP-complete problem, pairwise test suite generation problem has been addressed using several meta-heuristic algorithms including the Fuzzy Adaptive Teaching Learning-based Optimization (ATLBO) algorithm in the literature. ATLBO is a recent enhanced variant of Teaching Learning based Optimization (TLBO) algorithm that adaptively applies its search operations using a Mamdani-type fuzzy inference system. Presently, ATLBO enters into stagnation or sometimes converges abnormally after some iterations. To address this issue, this paper proposes ATLBO with a remedial operator so as to further improve its searching capabilities. To evaluate the performance of ATLBO with remedial operator, it is used in a strategy called pATLBO_RO for the pairwise test suite generation problem. Experimental results reveal the strong performance of pATLBO_RO against other meta-heuristic and hyper-heuristic based pairwise test suite generation strategies.

KEYWORDS: Pairwise testing; Adaptive Teaching Learning-Based Optimization; Mamdani fuzzy inference system

ACKNOWLEDGMENTS