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Handling constraints in combinatorial interaction testing in the presence of multi objective particle swarm and multithreading

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ABSTRACT

Context: Combinatorial testing strategies have lately received a lot of attention as a result of their diverse applications. In its simple form, a combinatorial strategy can reduce several input parameters (configurations) of a system into a small set based on their interaction (or combination). In practice, the input configurations of software systems are subjected to constraints, especially in case of highly configurable systems. To implement this feature within a strategy, many difficulties arise for construction. While there are many combinatorial interaction testing strategies nowadays, few of them support constraints.
Objective: This paper presents a new strategy, to construct combinatorial interaction test suites in the presence of constraints.
Method: The design and algorithms are provided in detail. To overcome the multi-judgement criteria for an optimal solution, the multi-objective particle swarm optimisation and multithreading are used. The strategy and its associated algorithms are evaluated extensively using different benchmarks and comparisons.
Results: Our results are promising as the evaluation results showed the efficiency and performance of each algorithm in the strategy. The benchmarking results also showed that the strategy can generate constrained test suites efficiently as compared to state-of-the-art strategies.
Conclusion: The proposed strategy can form a new way for constructing of constrained combinatorial interaction test suites. The strategy can form a new and effective base for future implementations.