

Title: Test Case Prioritization of Configurable Cyber-Physical Systems with Weight-Based Search Algorithms

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Abstract:

Cyber-Physical Systems (CPSs) can be found in many sectors (e.g., automotive and aerospace). These systems are usually configurable to give solutions based on different needs. The variability of these systems is large, which implies they can be set into millions of configurations. As a result, different testing processes are needed to efficiently test these systems: the appropriate configurations must be selected and relevant test cases for each configuration must be chosen as well as prioritized. Prioritizing the order in which the test cases are executed reduces the time for detecting faults in these kinds of systems. However, the test suite size is often large and exploring all the possible test case orders is infeasible. Search algorithms can help find optimal solutions from a large solution space. This paper presents an approach based on weight-based search algorithms for prioritizing the test cases for configurable CPSs. We empirically evaluate the performance of the following algorithms with two case studies: Weight-Based Genetic Algorithms, Random Weighted Genetic Algorithms, Greedy, Alternating Variable Method and Random Search (RS). Our results suggest that all the search algorithms outperform RS, which is taken as a baseline. Local search algorithms have shown better performance than global search algorithms. *Test Case Prioritization of Configurable Cyber-Physical Systems with Weight-Based Search Algorithms.*