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Multiobjective Test Case Prioritization Using Test Case Effectiveness: Multicriteria Scoring Method

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Abstract:
Modified source code validation is done by regression testing. In regression testing, the time and resources are limited, in which we have to select the minimal test cases from test suites to reduce execution time. The test case minimization process deals with the optimization of the regression testing by removing redundant test cases or prioritizing the test cases. This study proposed a test case prioritization approach based on multiobjective particle swarm optimization (MOPSO) by considering minimum execution time, maximum fault detection ability, and maximum code coverage. The MOPSO algorithm is used for the prioritization of test cases with parameters including execution time, fault detection ability, and code coverage. Three datasets are selected to evaluate the proposed MOPSO technique including TreeDataStructure, JodaTime, and Triangle. The proposed MOPSO is compared with the no ordering, reverse ordering, and random ordering technique for evaluating the effectiveness. The higher values of results represent the more effectiveness and the efficiency of the proposed MOPSO as compared to other approaches for TreeDataStructure, JodaTime, and Triangle datasets. The result is presented to 100-index mode relevant from low to high values; after that, test cases are prioritized. The experiment is conducted on three open-source java applications and evaluated using metrics inclusiveness, precision, and size reduction of a matrix of the test suite. The results revealed that all scenarios performed well in acceptable mode, and the technique is 17% to 86% more effective in terms of inclusiveness, 33% to 85% more effective in terms of precision, and 17% minimum to 86% maximum in size reduction of metrics.