

Research on some methods of generating test data for unit testing

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Abstract: This thesis investigates several methods for generating test data to support unit testing, a critical phase in software development. The study addresses the challenge of automating the creation of effective test inputs to improve software quality and reduce manual effort. We explore and compare multiple approaches, including random generation, symbolic execution, and search-based techniques such as genetic algorithms. The research evaluates these methods based on their ability to achieve high code coverage, detect faults, and optimize resource consumption. Experimental results demonstrate that while random generation is simple and fast, it often lacks thoroughness. Symbolic execution provides high precision but faces scalability issues with complex programs. Search-based methods offer a balanced trade-off, effectively generating diverse test cases for moderate-sized units. The thesis proposes a hybrid strategy that integrates the strengths of these techniques, showing improved performance in terms of coverage and fault detection rates. The findings contribute to the advancement of automated unit testing, offering practical guidance for selecting and combining test data generation methods in real-world software projects.

Keywords: test data generation, unit testing, generation method, software testing