

Hybrid Adaptive Random Testing for effective bug detection and coverage

Project Proposal

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Introduction

Random testing is a type of testing which generates good amount of test cases depending on source code. But the random testing suffers from the problem of fault detection. Adaptive Random Testing has proved to be an effective alternative to random testing. A testing process can be viewed as taking all possible inputs to the software under test, executing the samples one by one, and determining whether the outputs do not match the specification. Therefore, if the outputs do not match any specification, a software fault is revealed. A tester seeks to select test data with a view to maximizing the number of distinct faults detected.

The random testing has a disadvantage in form of fault detection. The Adaptive Random Testing overcomes this. Random Tester can infer statistical and reliability estimates. Since random testing does not make use of any information to generate test cases, it may not be a powerful testing method and its performance is solely dependent on the magnitude of failure rates. ART has been proposed as an enhancement to random testing. This is based on assumptions on how failing test cases are distributed in the input domain. Many authors have considered ART as more effective than only RT. I would also like to investigate how to adapt the coverage of ART.

Proposal

I am going to implement an innovative approach. I want to implement ART because of the low computational costs. The static and dynamic partitioning will also be tried in order to reduce computational costs. The Mirror Adaptive Random Testing will also be tried as it solves the disadvantages of the Adaptive Random Testing. The ART is a better random testing method which has a 50% better than traditional random testing methods. Most of the papers referred are from T.Y. Chen. The main plan is to provide better test harness SUT to reduce overhead. Random tester cannot guarantee to find the failures with low overhead. The main idea of adaptive random testing is to distribute test cases more evenly within the input space of SUT. RT is a popularly used technique for assessing software reliability. Its effectiveness in detecting software failures can be enhanced if test cases are evenly spread over the input domain. Such an intuition of even spread over the input domain. Therefore Mirror Adaptive Random Testing will also be tried applying in this project. The FSCS-ART is the

basic algorithm which will be used for this project. The ART might be implemented on the basic algorithm and then Mirror ART.

Plan

Initially my plan will be to survey papers related to ART and MART. The next step will be to find support of TSTL. The functions will be found which actually support TSTL. AVL tree example will be used for this proposal. The execution time and code coverage will be compared in the end with my tester and TSTL.

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