

Mirror Adaptive Random Test Generation in TSTL

Course: cs569

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Background

Random testing is known as a black-box software testing method. The inputs will be tested randomly and individually, the test output will show if the software get pass or fail. Random testing usually do not have any bias when testing and bugs can be captured quick by random testing. However, it random testing is imprecise (precise as specifications and specifications are not precise enough). Compare with other testing strategies, static program analysis can be served as an example, random testing has poor performance.

The appearance of adaptive random testing, which proposed by T.Y.Chen et al , enhance the ability of random testing by distribute test cases more evenly with the input space[1]. ART (Adaptive Random Testing) focus on improve the failure-detection effectiveness of random testing[2]. Further, the MART (Mirror Adaptive Radnom Testing), which proposed by T.Y.Chen et al, strengthen the cost-effectiveness of ART[3]. To be specific, MART can be decomposed as 4 steps following:

- Step1: sperate input domian as m size subdomains. Determining one source subdomain. (the rest of determin as mirror subdomain.)
- Step2: Implment test case generated by source subdomian applied with D-ART process(stop if bugs defected).
- Step 3: Test cases will be executed in sequential order by mirror function(stop if bugs defected).
- Step 4: repeat Step2&3 until bugs are defected (stop if bugs defected).

I choosen Mirror Adaptive Random Test Generation as my testing alogorithm for the reason following: Compare to RT(Random Testing), becuase MART inherit the core character of ART[3], MART is more effective than RT cause MART distribute test cases more evenly within the input spaces[1]. Compare to ART, due to the ART need vast quantity of computation(distance calculations, comparisons), MART is much simper and do not need much computation. For the reason above, MART aglorithm will be applied in my project.

Project Plan

1. For the first step of my implmentation plan, I will focus on the articles mentioned

above(especially focus on "Mirror Adaptive Random Testing"). Relevant knowledge (the D-ART process, mirror partitioning function, Max distance algorithm,) and articles will be collected at this period. 19, April - 27, April.

2. A very detailed implementation strategy will be made at this step, I will choose which mirror function to use, testing flow, detailed testing method.
3. I will determined testing object in this step, I plan to find out the suitable source code in the TSTL library. One of the tstl file under /CS569sp16/SUTs (to be determined) will be tested to see if I can get any results. 1, May - 30, May.
4. Finally, the relevant data (coverage, algorithms, testing flow) will be collected, and finally report will be edited. 1, June - end of Spring term.

Reference

[1] T.Y Chen, H. Leung, and I.K Mak. Adaptive Random Testing, 2004.

[2] Tsong Yueh Chen, Fei-Ching Kuo, Robert G. Merkel, T.H. Tse. Adaptive Random Testing: The ART of test case diversity, 2009

[3] T.Y.Chen, F.C.Kuo, R.g.Merkel, S.P.Ng. Mirror Adaptive Random Testing, 2004.

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