CS 569 spring 2016 – Project

Competitive Milestone 2

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Introduction

This is my second version document for this project. In the first proposal, I intended to implement the adaptive random testing method. However, this method is very different method to implement. So I implement a new generation testing method based on the sut algorithm, and improve the cover tester algorithm. Since the random testing method is a black-box software testing technique, so the program uses the randomly generated inputs[1]. It actually has many advantages. In the most complex systems, the random testing could produce some inputs that are would not think to try for users, For the most programs, this testing approach is useful, but there are still some programs are not always found bugs when using the random testing, because this method could not make sure every possible inputs would be tested. So I plan to implement a generation testing method to improve the random testing method.

Algorithm and Explanation

In this project, the main idea to implement a test generation as follows: This is a document for tester2.py file. In this project, I will implement a testing generator base on the information taught in the class. So the program will do the following things. Firstly, it will use generate the random test, and check the coverage of the statement. Use the randomEnabled() in the sut file to random find the enabled action, and check if it is safe action. Then finding the coverage lower than a fix number, which means this part need to be mainly tested. Then storing these statements. When finding a bug, printing it out in the TSTL API. In the first part of this project, I define a function, which is the same function as the randomtester.py. The function will add command line parameters, it also set input sys.argv to the parameters. Then define a function called make_config, which is also use the randomtester.py as reference, and it returns a dictionary.

When running this file in the command line to test the sut.py of avl, it can actually find bugs. The result is shown as the following screenshot:

```
59, 262, 263, 264, 267, 268, 270, 271, 272, 273, 2
TSTL BRANCH COUNT: 189
TSTL STATEMENT COUNT: 141
8 FAILED
189 BRANCH
20049 TOTAL ACTIONS
30.8664178848 TOTAL RUNTIME
```

When running the testing generation, users can just run in the command line with parameters. First of all, put the sut.py file and tester1.py file in the same directory. To run the test generation on the command line, use seven parameters in the command. The first number denotes the timeout that the testing generation will stop when the program runs this time. The second denotes seed, which is for python random.random object used for random number generation in the code. The third parameter denotes maximum length of the test generated. The next represents the maximum memory that is basically a search width. The next three parameters can be set in 0 or 1. The last third parameter means the test generation will not check for faults in the SUT. So when testing the file should set it to 1 to find bug. The following two parameters mean that the final coverage report will be produced and also the branch coverage will be produced. In the future work, I will add more functions and make it more interesting. I will keep revising my code. I will try my best to define functions to handle failure.

Reference

[1] Alex Groce, Gerard Holzmann, and Rajeev Joshi. Randomized differential testing as a prelude to formal verification. *Software Engineering,* 2007. ICSE 2007. 29th International Conference on, pages 621-631. IEEE, 2007.