Bachelor/Master Thesis Topic

Effective Test Case Generation with Probabilistic Symbolic Execution

Motivation and Background

The quality of the test suite significantly influences the likelihood of finding faults in realistic software systems. However optimizing test suites is currently a really hard research topic.

Goals

The goal of this project is to implement and evaluate (based on simulations and realistic examples) different test case generation strategies based on probabilistic symbolic execution [1,2] and prepare the technology for an industrial use.

Description of the Task

The project aims to apply probabilistic symbolic execution for test case generation. The specific tasks are:

- Understand the current approaches in test case generation via symbolic execution
- Getting familiar with symbolic execution tool support, namely JPF
- Understanding the current research in probabilistic symbolic execution [1,2]
- Developing ideas to use heuristics to generate test suites based on the results obtained from symbolic execution
- Evaluate the heuristics via realistic cases. Therefore it is recommended to mine version histories and check the ability of the generated test suites to find realistic bugs.

Research Type

Theoretical Aspects:	****☆
Industrial Relevance:	***☆☆
Implementation	****☆☆

Prerequisite

The student should be enrolled in the bachelor/master of software engineering or bachelor/master of computer science program, and has completed the required course modules to start a bachelor/master thesis.

Skills required

Programming skills in Java or C++, Understanding of, or willingness to learn, the software engineering and statistical foundations needed for the project.

References

[1] A. Filieri, C. S. Pasareanu, and W. Visser. Reliability analysis in symbolic pathfinder. In Proceedings of the 2013 International Conference on Software Engineering, ICSE '13, pages 622–631.

[2] J. Geldenhuys, M. B. Dwyer, and W. Visser. Probabilistic symbolic execution. In Proceedings of the 2012 International Symposium on Software Testing and Analysis, ISSTA 2012, pages 166–176, New York,NY, USA, 2012. ACM.

Contacts

Lars Grunske, Humboldt-Universität zu Berlin, Institut für Informatik, Lehrstuhl Software Engineering, Unter den Linden 6, 10099 Berlin, Germany

Application

Please contact me during my office hours or send me an email with the title: "[ThesisProject]-TestCaseGenPSE" to se-career@informatik.hu-berlin.de