Bachelor/Master Thesis Topic
Analyzing Parameter Tuning in Search-Based Test Case Generation Techniques

Motivation and Background

Software testing is a crucial part of software development. It enables assurance, of correctness, completeness and reliability of software systems. Current state-of-the-art software testing techniques employ optimization methods, such as genetic algorithms to handle the difficult and laborious task of test data generation [1]. Despite their general applicability, genetic algorithms have to be parameterized in order to produce results with high quality. Different parameter values may be optimal for different problems [2]. Therefore an interesting solution is to apply self-tuning adaptive optimization strategies [3] for the test data generation problem.

Goals

The goal of this project is to evaluate (based on simulations and realistic examples) different test case generation strategies with adaptive self-tuning genetic algorithms.

Description of the Task

The project aims to apply adaptive GAs for test case generation. The specific tasks are:
- Understand the current approaches in test case generation via SBSE approaches
- Getting familiar with test case generation tool support, namely EvoSuite [1]
- Perform an experimental evaluation of adaptive self-tuning genetic algorithms

Research Type

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

Prerequisite

The student should be enrolled in the bachelor/master of software engineering/informatics 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] Andrea Arcuri and Gordon Fraser. Parameter tuning or default values? an empirical investigation in search-based software engineering. Empirical Software Engineering, 18(3):594-623, 2013.

[2] Gordon Fraser and Andrea Arcuri. Whole test suite generation. IEEE Transactions on Software Engineering, 39(2):276-291, 2013.

[3] Aldeida Aleti and Irene Moser. Entropy-based adaptive range parameter control for evolutionary algorithms. In Proceeding of the fifteenth annual conference on Genetic and evolutionary computation conference, GECCO '13, pages 1501-1508. ACM, 2013.

Contacts

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Application

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