Bachelor/Master Thesis Topic

Search-Space Classification for Test Case Selection and Prioritization Problems

Motivation and Background
As the complexity of software increases, designing and developing new software systems becomes more challenging. To handle this complexity, there is a trend to partially automate software development tasks supported by optimization methods. This area is known as Search Based Software Engineering (SBSE) [Har07a]. Test case selection and prioritization techniques are usually applied during regression testing [YH12], which is a quality assurance activity that provides confidence that code changes and the resulting evolution steps do not break the current functionality of the system. The goal of regression testing is to uncover behavioral changes from one software version to the next. These changes are known as regression errors. Since test suites grow during the evolution of a software systems because more and more functionality is covered by the test cases, large projects cannot re-run the complete test suite for every build of the system. As a result, it is the goal of a search process to minimize the test suite [REM’04, SYGM15], select the most suitable test cases [YH07] or to prioritize the test cases [DRK06, DMTR10, EMRO2, KKT07, LHH07, LLC’16, MIA’16, SYGM15] with the goal to have a highest chance to uncover regression errors in a limited testing time budget [YH12]. Generally, SBSE techniques are suitable for these problems, since regression testing provides a clear oracle when a test case has failed. This oracle is constructed by the test results of the previous and the current software version. If both are identical no regression error has been revealed.

Goals
The goal of this project is to analyses the search space for common test case selection and prioritization problems.

Description of the Task
- Understand the current problems in test case selection and prioritization
- Run and analyses experiments in the area of test case selection and prioritization
- Provide information/characterization about the search spaces in this area

Research Type
Theoretical Aspects: *****
Industrial Relevance: *****
Implementation: *****

Prerequisite
The student should be enrolled in the 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 software analysis foundations needed for the project.

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]-SC4SBSE-TestSelectPrio” to se-career@informatik.hu-berlin.de
References


