

— Bachelor's Thesis —

Test case generation for a verification framework

What is it all about?

Correctness of software has always been a major concern for developers. While in some domains a system failure might only annoy the user, there are also certain domains, where failures may entail high economical cost or even pose a danger to life. In the latter domains failures are intolerable and ensuring safety is the most crucial goal. Due to its sound and complete nature, **model checking** is a widely adopted technique to ensure that all executions comply with the specification. However, while nearly all model checking approaches are sound and complete, i.e. if there exists an erroneous execution it will be found and if none are found there indeed does not exist one, this is sometimes more of a theoretical result, as the application of all approaches is in practice hampered by two major physical restrictions. Model checking is neither applicable if it yields results after several decades or needs more memory space than physically or technically possible. To circumvent these natural restrictions, all model checkers are equipped with time and memory limits. If one of those limits is exceeded, the model checker will stop and output an unknown result.

Here automatic generation of test cases promises to deliver at least some results when the model checker is not able to do so. The main goal of this thesis is to implement such an automatic test case generation on top of the existing model checking framework, such that it returns a set of testcases if model checking fails.

What is to be done?

1. Investigate existing test case generation approaches.
2. Implement all findings in the VPLC model checking framework written in F#.
3. Evaluate your implementation on case studies..

Requirements

- Solid background in theoretical computer science.
- Lectures on testing.
- Some background in model checking.

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