Software Engineering Seminar (WiSe 2020/21)

**Automating Metamorphic Testing in Large Scale Systems**

**Description**

Software testing is a crucial part of software development. It enables assurance, of correctness, completeness, and reliability of software systems. Most state-of-the-art software testing techniques employ approaches that require the tester to have some kind of an oracle in order to evaluate the outcomes of the tests within the suite. Metamorphic testing[1] is specifically designed to test software without such an oracle. The idea is to identify and refine a set of metamorphic relations between the software inputs and outputs. Just to give an abstract example, for a square root function $\sqrt{x}$ the relation $x = \sqrt{x} \cdot \sqrt{x}$ should hold under reasonable floating point accuracies.

With ever growing programs, finding a good enough oracle is becoming an ever harder problem, even for domain experts. Contrastingly, finding metamorphic relations is a task that domain experts can provide answers for. However, finding these highly domain dependant relations in an automated fashion is for many fields still an open research problem. Some approaches such as [2] or [3] have been developed and evaluated in the past.

In this seminar, the student is required to examine and discuss the state-of-art approaches that automatically generate or learn metamorphic relations. The student should compare different approaches and give insights into future research.

**References**


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