Analysis and improvement of software testing processes and artefacts

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**Topic Description:** Software testing is the primarily used approach in software verification and validation. Software testing usually consumes a considerable share of the total project budget; however, the quality of the testing processes (including efficiency and effectiveness) is rarely systematically assessed. There are various approaches to evaluate testing processes, and the most popular ones are based on code coverage. Code coverage is relatively simple to compute and is believed to be correlated with the defect-detection rate of testing. There are certain models that can be used to predict the expected rate of improvement in code coverage (and defect-detection rate) based on the metrics from the current test cycle. We can also classify between individual test cases or test groups according to their quality level (completeness, redundancy, etc.) compared to other test cases. This way, we are able to improve and optimize our testing processes. However, these models often are unable to reflect the reality reliably because they build on simple assumptions such all code parts are equal in terms of testing and risk.

The task in this research topic is to develop and evaluate such test evaluation models, which better describe realistic software systems and testing processes. One of the research directions is to investigate the applicability of existing quality indicators (such as source code metrics, coding issues and bad smells) in software test process evaluation and improvement. The researchers at the Software Engineering Department have large experience in the static quality assessment of source code, but extending this area to test assessment has significant research potential.

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