Administrative Information

Refining Test Suites to Enhance Coverage-based Fault Localization

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Scientific Information

Objectives - الهدف

This project proposes new methods to refine test suites for the purpose of enhancing fault localization. A coincidentally correct test is a test that produces a correct output while the main condition for failure is met. That is, the defect is executed but no failure is observed. Coincidental correctness is prevalent and is a safety reducing factor for coverage-based fault localization. In this work we proposed to devise effective techniques to remove coincidentally correct tests from test suites for the purpose of enhancing the quality of fault localization.

Achievements - الإنجازات المحققة
Cleansing coincidentally correct tests was addressed through three techniques, two are based on cluster analysis and fuzzy logic, and the third is based on multivariate visualization. A fault localization technique based on multivariate visualization was also proposed.

**Perspectives**

In the late nineties, the software engineering community shifted its focus from *how to develop software* (e.g., inventing better methodologies and languages) to *how to make software more reliable and secure*. The importance of this work stems from the fact that it investigates an important reliability enhancing research area, namely, fault localization.

**Publications & Communications**

This work resulted in two submissions:

1) "Prevalence of Coincidental Correctness and Mitigation of its Impact on Fault-Localization", ACM Transactions on Software Engineering and Methodology (TOSEM)
2) "Software Analysis via Multivariate Visualization", Regression 2012.

Note that TOSEM is considered to be one of the top 2 venues of publications in software engineering. And Regression 2012 is a workshop/conference to take place in Montreal mid April.

**Abstract**

In regard to cleansing coincidentally correct tests, we evaluated the effectiveness of our techniques by empirically quantifying their accuracy in identifying coincidentally correct tests in 78 test suites. The results were promising, e.g., the better performing technique exhibited 11% false negatives and 20% false positives on average, and no false negatives nor false positives for 13 test suites.

We also believe in the potential of our proposed visualization based fault localization technique, something to be validated in the future.