Title: Improving Oracle Quality by Detecting Brittle Assertions and Unused Inputs in Tests

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Motivation:

For modern software, it is often difficult to write oracles. The previous techniques help developers to write test cases that focus on choosing inputs, which address only part of the overall problem. Developers create oracles, resulting in tests that are unable to detect failures or tests that are brittle and hard to maintain. In practice, the oracles created by developers checks too little, by failing to include the assertions for relevant variables which results in *missed warnings*, and checking too much, by including assertions about irrelevant variables results in *false warnings*. This paper introduces new technique that automatically analyzes the test oracles. And also presents OraclePolish, an implementation of the technique which analyzes Java applications and tests written using JUnit testing framework.

Proposed Solution:

The paper proposed a dynamic analysis technique that automatically analyses the test oracles. This technique is based on dynamic tainting which tracks the flow of controlled and uncontrolled inputs along the data and controlled dependencies at run time. When a test completes its execution, the technique generate reports using tracked information, that identify *brittle assertions* which are derived from uncontrolled inputs and *unused inputs* which are controlled by the test but are not checked by an assertion. These reports are filtered to remove false positives and presented to testers.

Evaluation:

Researchers evaluated the proposed technique using OraclePolish, that can analyze tests that are written in Java and use the JUnit testing framework. They conducted an experimental evaluation to analyze over 4,000 tests from real, open source software projects and also to answer research questions about effectiveness and feasibility of the technique, and the quality of existing test oracles. The results of the evaluation demonstrates that OraclePolish is effective, which detected 164 tests of brittle assertions and 1618 tests of unused inputs. Furthermore, the results also indicate that the cost associated with using the technique are reasonable.

Analysis:

Good Point:

In this paper, the new technique generates the report that shows experimental data, which makes easy for the testers to get clear idea about both the brittle assertions and the unused inputs.

Bad Point:

The proposed technique only detects the brittle assertions and unused inputs. But it is not sufficient to improve Oracle quality. It could be extended considering few other tests.

Potential Project:

This project can be extended to debug the reported oracle problems and the generated report can also include the comprehensive explanation about debugging which makes easier for the developers to understand about the detected oracle problems.

Questions:

1) How accurate are the reports that are generated by OraclePolish?
2) Does the proposed technique detect both brittle assertions and unused inputs in real test suites?