Accommodating Test Dependence in Testing Algorithms

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Introduction to Testing

- Regression testing verifies previously tested software performs correctly after it was changed
- Testing techniques are used to reorder tests and save testing time
- Some tests initialize or modify values another tests uses

```java
static int x = 0;
void testXDefaultVal() {
    assertEquals(0, x);
}
void testChangingXVal() {
    x = 1 + x;
    assertEquals(1, x);
}
```

Test code containing test dependence.

Regression Testing Techniques

- Test Prioritization – tests with a higher chance of finding faults are executed first
- Test Selection – only tests that cover changed / modified code are executed
- Test Parallelization – execute tests on multiple machines in parallel

Research Problems

Are There Better Ways to Detect Dependent Tests?

- Empirically compare our methodology for finding dependent tests with other documented methodologies

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```

Findings: information from their tool gives insufficient information about test dependency.
- In fact, their tool found 0 dependent tests while ours found hundreds!

Results

- Wrote a script to run a tool created by a team at University of Nebraska – Lincoln
- Findings: information from their tool gives insufficient information about test dependency.
  - In fact, their tool found 0 dependent tests while ours found hundreds!

Is Test Dependency Always a Problem During Software Evolution?

- Empirically investigate how prevalent test dependence is for any arbitrary revision of our subjects

- Created a script to perform test selection to find dependent tests across any two arbitrary revisions of our subjects
- Findings: No dependencies captured for human written tests between the 2 revisions analyzed
  - Methodology could have been flawed due to using incorrect test information
- Current work: Evaluate how test dependence affects automatically-generated tests on arbitrary revisions of our subjects