NATIC: Naming Amplified Tests by using Improved Coverage

CSE3000 Research Project by Nienke Nijkamp – Supervision by Carolin Brandt and Andy Zaidman – 30-06-2021

1. Background

- TestCube generates unit test cases from manually written test cases
- Generated test cases have generic and unclear names

```java
// Original Test Case
@Test
public void testId() {
    Document doc = Jsoup.parse("<div id=Foo>");
    Element el = doc.selectFirst("div");
    assertEquals("Foo", el.id());
}
// Amplified Test Case
@Test
public void testId_assSep8() throws Exception {
    Document doc = Jsoup.parse("<div id=Foo>");
    Element el = doc.selectFirst("div");
    assertFalse(doc.hasText());
}
```

2. Research Question

What approach can be implemented to improve generated test names in order to enhance their readability?

3. NATIC

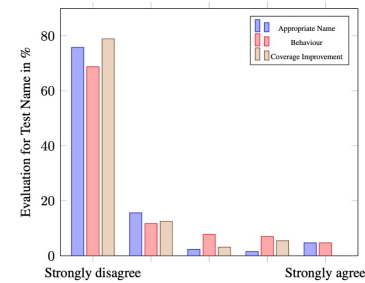| Coverage Improvement for Methods	TestCube Implementation	NATIC	Expert
hasText outputSettings	dropSlashFromAttribute Name-mg43-assSep103	testOutputSettingsAndHasText	testSetOutputSettingsWithText
clone doClone	filter-mg69-assSep208	testCloneAndDoClone	testCloneEmptyElement
documentType	testGetChildText-mg30-assSep223	testDocumentType	testDocumentTypeIsNull

4. Results

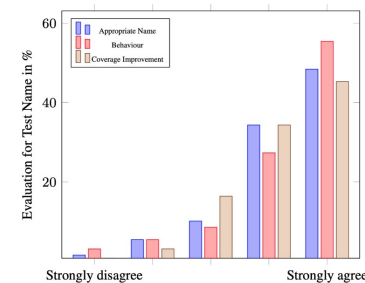Figure 3: Distribution for TestCube Implementation
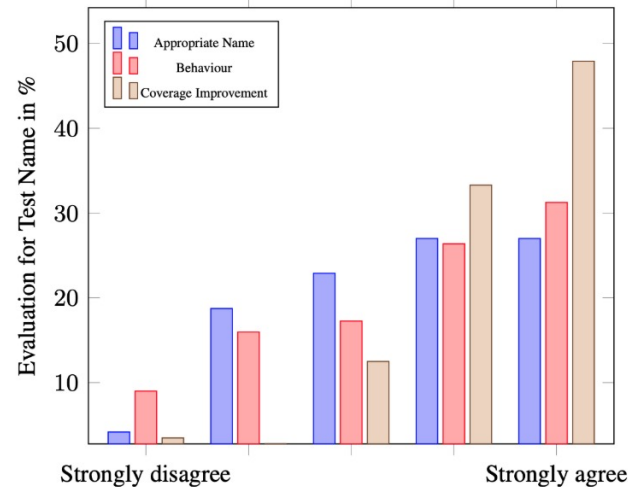

Figure 4: Distribution for Expert

Figure 5: Distribution for NATIC

5. Discussion

```java
// Test 3
// Improves Coverage in: toString, outerHtml
@Test
public void testToStringAndOuterHtml() throws
    Exception {}

// Test 5
// Improves Coverage in: rewindToMark,
    cacheString, consumeCharacterReference
@Test
public void testRewindToMarkAndCache
StringAndConsumeCharacterReference() throws
    Exception {}
```

Hypothesis: More than 2 coverage goals negatively impacts the agreement rating
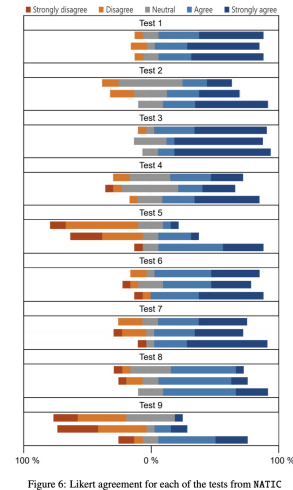

Figure 6: Likert agreement for each of the tests from NATIC

6. Conclusion

- NATIC has a combined agreement rate of 64%
- With the proposed reduction of maximum goals we expect the rating to go up
- NATIC is a valuable addition to TestCube and increases readability of test cases

n.nijkamp@student.tudelft.nl – c.e.brandt@tudelft.nl – a.e.zaidman@tudelft.nl