

SURVEY ON INTERACTIVE TEST CASE GENERATION

Thanks to participating in our experiment, aimed at observing how developers interact and provide their opinion on test case readability during the test case generation process performed by the test case generation tool EvoSuite.

We would be grateful if you could perform the prepared activity: the execution of EvoSuite to generate a test suite for the class `ArrayIntList.java`. At some points during this execution, you will be asked to review and assign scores to some test cases based on your perception of their readability.

Before moving on to the experiment, please make sure that you have understood and successfully completed the sample execution.

Statement of consent

All of the information that you provide will be treated as confidential and will only be used for research purposes. Some personal information may be collected about you if you choose to participate in the survey. In particular, your responses to survey questions and your personal details will be collected for the simply reason of linking your responses with the projects. We will not disclose your personal information to third parties.

Please, fill in the following information:

<i>Identification number assigned to you</i>	
<i>Date of session</i>	
<i>Identification of session</i>	

- *Your current position is: (tick your selected option)*
 - ☐ Bachelor's student
 - ☐ Master's student
 - ☐ PhD's student
 - ☐ Faculty
 - ☐ Professional developer

- *Years of experience programming in Java:*
 - ☐ <1 year
 - ☐ 1-2 years
 - ☐ 3-6 years
 - ☐ 7-10 years
 - ☐ >10 years

- *Years of experience testing software:*
 - ☐ <1 year
 - ☐ 1-2 years
 - ☐ 3-6 years
 - ☐ 7-10 years
 - ☐ >10 years
- *Rate your programming skills in Java. A number from 1 (low) to 5 (high):*

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	2	3	4	5

Activity

This document explains the activity you are encouraged to perform in the experiment. Read carefully the information before starting the execution.

- TARGET class: `ArrayIntList.java`
- GOAL: execute the test case generation tool EvoSuite and provide your opinion on test case readability at the moments of interaction when required by the tool.
- TIMING: You have a limit of **50** minutes in total:
 - In first place, **10** minutes to inspect and become familiar with the source code of the target class.
 - In second place, **40** minutes to execute the tool. Please, note that **this is a strict maximum** and that you are expected to finish earlier. We estimate that the whole execution should take between 20 or 25 minutes, which depends on the number of interactions required by the tool and the time it takes you to provide readability scores for the test cases selected for revision.
- INTERACTIONS: During the execution, you will be prompted to interact no more than **10** times and, in each interaction, you will have to revise no more than **4** test cases.
- READABILITY SCORES: Between **0** (low readability) and **10** (high readability). Test cases with scores under 3 will not be transferred to the preference archive.

Configuration:

- 1) In the menu, click Navigate / Open resource... In the popup window, type `InteractiveArrayIntListSystemTest.java`. You should see two entries: select the file in “evosuite-master” and click Open.
- 2) Set the seed for your execution. The seed will be the “*Identification number*” assigned to you previously. For example, if your identification number is “321”, then:

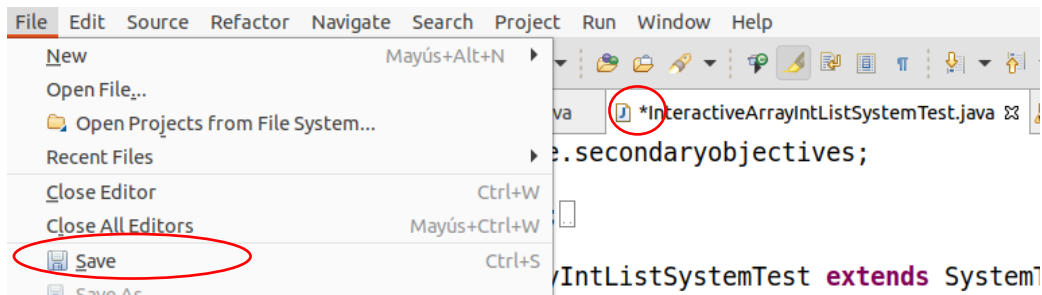
Before:

```
InteractiveArrayIntListSystemTest.java
1 package org.evosuite.testcase.secondaryob
2
3 import org.evosuite.EvoSuite;
15
16 public class InteractiveArrayIntListSyste
17
18 @Test
19 public void testArrayIntListClass()
20
21 /** TO BE CONFIGURED ***/
22
23 Randomness.setSeed(0);
```

After:

```
*InteractiveArrayIntListSystemTest.java
1 package org.evosuite.testcase.secondaryob
2
3 import org.evosuite.EvoSuite;
15
16 public class InteractiveArrayIntListSyste
17
18 @Test
19 public void testArrayIntListClass() {
20
21 /** TO BE CONFIGURED ***/
22
23 Randomness.setSeed(321);
```

Don't forget to save the file (the asterisk has to disappear):



Note: Please, do not modify any other property unless instructed to do so.

3) Click “Run / Run Configurations...” in the menu:

- Make sure that the “Test class” is *InteractiveArrayIntListSystemTest*. Otherwise, click “Search...” and select this class.
- Change the “Test runner” to JUnit 4.

Click “Apply” and then click “Close”.

Additional notes:

- Remember that you can consult the goal covered by the test cases at the interaction moments (file *goal.txt*). This can help you understand why those test cases are relevant. The system will also inform you of previously addressed goals so that you can compare the test cases to be valued in the current interaction with those already reviewed in a previous interaction.
- Be careful to correctly assign the readability scores to their corresponding test cases. **Double check the number of each test case** to provide the scores in the correct order. Recall that you do not need to attach a score to those test cases labeled as “AlreadyValued” or “Preferred”.
- Remember that you can observe the preference archive, which contains your preferred test cases, at any time during the execution. The systems places this archive in the output folder and updates it when new test cases are inserted or replace existing ones.

Please, for this activity annotate the time you begin to do the activity and the time you finish it.

Now you can start the activity.

Click somewhere in the file `InteractiveArrayIntListSystemTest.java` and then click “Run / Run” in the menu:

Start time

Please, do not interrupt the execution once started.

At the end of the execution, write down the time:

End time

Now, please fill in the questionnaire that you will find below

Questionnaire

For each of the following questions about the **test generation process**, please specify whether you fully agree, partially agree, partially disagree, or fully disagree.

	Fully disagree	Partially disagree	Partially agree	Fully agree
<i>I had enough time to become familiar with the target class</i>				
<i>The target class was easy to understand</i>				
<i>I had enough time to finish the execution</i>				
<i>The execution proceeded as expected</i>				

For each of the following questions about **test readability**, please specify whether you fully agree, partially agree, partially disagree, or fully disagree.

	Fully disagree	Partially disagree	Partially agree	Fully agree
<i>The revised tests cases were easy to understand</i>				
<i>Could you appreciate differences regarding the readability of test cases revised in the same interaction?</i>				
<i>Was it easy to assign a readability score to each of the test cases?</i>				
<i>Was the goal useful to guide you when evaluating the readability of the test cases?</i>				

Please rank the following **readability aspects** in order of importance from 1 to 5 (where 1 is most important to you and 5 is least), depending on how they impacted your decision when assigning readability scores to test cases. Values can be repeated if desired.

	1	2	3	4	5
<i>Values given to variables</i>					
<i>Arguments used in the invocation to the constructors and methods</i>					
<i>Test length (lines, characters,...)</i>					
<i>Number of different classes and methods appearing in the test case</i>					
<i>Similarity to the test case I would have written</i>					
<i>Others (specify):</i>					

For each of the following questions about the **interaction process**, please specify whether you fully agree, partially agree, partially disagree, or fully disagree.

	Fully disagree	Partially disagree	Partially agree	Fully agree
<i>The number of interactions was appropriate</i>				
<i>The number of tests to revise in each interaction was appropriate</i>				
<i>The interactions were tedious and costly in time</i>				
<i>I paid more attention to the earlier interactions than the later ones</i>				
<i>It was useful to be informed about the score assigned to already revised test cases</i>				
<i>The preference archive was useful to know that my decisions were taken into account and had an impact on the final result</i>				

For each of the following questions about **usefulness**, please specify whether you fully agree, partially agree, partially disagree, or fully disagree.

	Fully disagree	Partially disagree	Partially agree	Fully agree
<i>The review and comparison of test cases helped me better understand the purpose of some of the test cases in the final test suite</i>				
To answer the next questions, compare the obtained test suite with two other test suites that you will find in the package "com.org.apache.commons.collections.primitives", with the names: <code>ArrayIntList_ES_1_Test.java</code> and <code>ArrayIntList_ES_2_Test.java</code> . You can find them with the option <code>Navigate / Open resource...</code>				
<i>The final test suite is more readable than the other test suites provided for the same class</i>				
<i>The time spent on interactions has compensated for the result</i>				

Apart from providing a readability score, would you have liked to have the opportunity to (you can select multiple options):

- ☐ Modify values of variables or arguments used within test cases on the fly
- ☐ Reward/penalize individual parts of a test case (e.g., a sequence of method calls) so that the tool takes it into account in the generation of new test cases.
- ☐ Combine parts of two or more test cases.
- ☐ Suggest the inclusion of new objects or the invocation of different methods.
- ☐ Add new assertions

?

If you have any additional comment or suggestion, please write in the following text area:

Thank you very much for your time. Now that the execution finished and you filled in the questionnaire, please:

- Zip the folder of the execution (Ejecucion_ArrayIntList)
- Save this doc file with your responses.

Rename both files with the following name:

“Identification of session” + _ + “Identification number”

And send the folder and the doc file to the following e-mail addresses:

pedro.delgado at gm.uca.es

aramirez.uco at gmail.com