

Clone Overflow: Code Reuse in Online Corpora and Its Effects

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ABSTRACT

This paper provides a sample of a \LaTeX document which conforms, somewhat loosely, to the formatting guidelines for ACM SIG Proceedings. It is an *alternate* style which produces a *tighter-looking* paper and was designed in response to concerns expressed, by authors, over page-budgets. It complements the document *Author's (Alternate) Guide to Preparing ACM SIG Proceedings Using $\text{\LaTeX}2_{\epsilon}$ and Bib \TeX* . This source file has been written with the intention of being compiled under $\text{\LaTeX}2_{\epsilon}$ and Bib \TeX .

The developers have tried to include every imaginable sort of “bells and whistles”, such as a subtitle, footnotes on title, subtitle and authors, as well as in the text, and every optional component (e.g. Acknowledgments, Additional Authors, Appendices), not to mention examples of equations, theorems, tables and figures.

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1. INTRODUCTION

2. RESEARCH QUESTIONS

RQ1 (online code clone): *How source code are reused between Q&A sites and open source projects?* We would like to observe whether this phenomenon has happened and at what scale.

RQ2 (flow of online code clone): *what are the directions source code have been reused?* If the code reuse between the two locations exist, we would like to discover the which direction the code that have been copied. Is it from Q&A site to open source projects, or the other way around, or both?

RQ3 (classification of online code clone): *How and why did these online code clone happen?* Can we categorise them?

RQ4 (effects of online code clone): *Is this phenomenon*

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of online code clone harmful and how? is there any evidence of problems caused by reusing code between Q&A sites and open source projects?

3. EXPERIMENTAL SETUP

3.1 Dataset

In our study, we selected Qualitas corpus containing 64 Java open source projects [5]. However, we found that *eclipse* project does not contain source code so we removed it from the dataset. This results in totally 63 projects being analysed. The details of the 63 Qualitas projects are listed in Table 3.

3.2 Code Similarity Measurement

We selected two clone detectors for this study: Simian [1] and NiCad [2, 3]. **FIXME: Add more info about clone detection tools in general and more details of these two tools**

4. RESULTS

The results of running 2 clone detectors: Simian and NiCad, to detect clones between 144,075 Stackoverflow fragments (Java accepted answers) and 63 open-source projects in Qualitas dataset is presented below. There are 2 tools selected: Simian and NiCad. They are configured using two different settings: default settings, and settings from another study [6]. Full Simian's parameter names can be found from the footnote¹.

Manual investigation of Simian's clone report showed that there were problematic 11 fragments. These fragments generate false clone containing array initialisation. Hence, they were removed from the result set before analysis.

4.1 Agreement based clone pairs vs. Non agreement based clone pairs

The agreement-based clone pairs are the ones discovered using Bellon's *good-match*(0.7) and *ok-match*(0.7) criteria as listed in Table 5. Non-agreement based clone pairs are the ones that are solely reported by a single tool. The agreement-based pairs provide higher confident that they are real clones than the non-agreement based ones.

¹Simian's parameters: `iChar = ignoreCharacters`, `iCurlB = ignoreCurlyBraces`, `ild = ignoreIdentifiers`, `ildC = ignoreIdentifierCase`, `iMod = ignoreModifiers`, `iStrC = ignoreStringCase`, `iStr = ignoreStrings`, `iSbtNm = ignoreSubtypeName`, `bSqBrck=balanceSquareBrackets`

Table 1: Qualitas-*O* (2013-09-01r) clone results

Statistics	Simian Default settings			Simian FSE'13 settings			NiCad Default settings			NiCad FSE'13 settings		
	792 fragments			1229 fragments			1141 fragments			12400 fragments		
	C_{pairs}	C_{SLOC}	$C_{\%}$	C_{pairs}	C_{SLOC}	$C_{\%}$	C_{pairs}	C_{SLOC}	$C_{\%}$	C_{pairs}	C_{SLOC}	$C_{\%}$
Total	24,929	—	—	16,957,362	—	—	105,118	—	—	113,557,298	—	—
Mean	38	7.54	0.27	14,444	4.80	0.28	107	9.52	0.25	9,397	5.21	0.20
Std Dev.	87	3.21	0.22	281,747	1.22	0.18	198	3.07	0.18	12,098	1.73	0.16
Max	551	49.00	0.94	9,599,676	18.00	0.89	1,792	39.00	0.80	227,077	44.00	0.86
Min	1	5.00	0.01	1	4.00	0.02	1	7.00	0.02	1	3.00	0.01
Median	3	7.00	0.23	22	5.00	0.24	15	8.00	0.19	6,105	5.00	0.15
Mode	1	7.00	0.25	1	4.00	0.50	1	8.00	0.53	1	4.00	0.33

Table 2: Qualitas-*N* (2016-08-05) clone results (44 new Qualitas projects)

Statistics	Simian Default settings			Simian FSE'13 settings			NiCad Default settings			NiCad FSE'13 settings		
	707 fragments			1205 fragments			1068 fragments			10231 fragments		
	C_{pairs}	C_{SLOC}	$C_{\%}$	C_{pairs}	C_{SLOC}	$C_{\%}$	C_{pairs}	C_{SLOC}	$C_{\%}$	C_{pairs}	C_{SLOC}	$C_{\%}$
Total	60,536	—	—	22,797,190	—	—	648,165	—	—	573,438,528	—	—
Mean	86	7.37	0.26	18,919	4.85	0.28	607	9.39	0.25	47663	5.22	0.20
Std Dev.	217	2.22	0.21	326,588	1.31	0.19	1,499	2.98	1.81	58,833	2.77	0.15
Max	1,298	32.00	0.94	11,127,286	21.00	0.92	10,550	36.00	0.84	1,246,598	250	0.96
Min	1	5.00	0.01	1	4.00	0.02	1	7	0.02	1	2.00	0.01
Median	2	7.00	0.21	20	5.00	0.25	33	8	0.19	52,077	5.00	0.15
Mode	1	7.00	0.25	1	4.00	0.50	1	8	0.67	1	4.00	0.33

4.2 Agreement based clone pairs

For agreement-based clone pairs, we use the threshold of 0.7 for both *good-match* and *ok-match*. Visualisation of *good-match* common clone pairs between sets of parameter settings can be seen from Figure 1. There are 1,357 unique *good-match* pairs. The *ok-match* subsumes the *good-match* resulting in totally 10,139 common clone pairs (Figure 2).

However, for NiCad’s settings, we found a few renaming and clustering errors which resulted in fewer projects with clone reports. For NiCad default settings (NiCad_{df}), 6 projects had clustering failed errors. For NiCad FSE13 settings (NiCad_{fse13}), 4 projects had renaming failed errors and 13 projects had clustering failed errors as depicted in Table 4. So these projects are also missing from agreed clone pairs. **FIXME: Report the errors to NiCad creator.**

FIXME: Maybe no longer needed? We are interested in discovering reused code in the latest versions of Qualitas projects. So, we downloaded the newest release of each project and found 44 of them having newer updates. Then, we reran the experiment again on these 44 projects. Several projects triggered NiCad problem of clustering and renaming again as listed in Table 4. The agreed clone pairs using Bellon’s *good-match*(0.7) and *ok-match*(0.7) criteria of this new dataset are also listed in Table 5.

4.3 Manual investigation of agreement-based clone pairs

The classification scheme is described in Table 6 and the classification results are shown in Table 7. We have manually investigated all of the 1,357 *good-match* ones reported by agreement of four different Simian and NiCad settings. However, for the *ok-match*, we could not investigate all of the 10,139 pairs manually. According to the distribution of category from *good-match* results, we can see that Simian_{fse13}–NiCad_{fse13} produces a large number, 1,338, of false positive results (D, E, and F). Thus, we decided to leave them out of the manual investigation of *ok-match* pairs. There are totally 608 *ok-match* pairs that were investigated. The 39 true positive pairs found are combinations of 8 unique Stack-

overflow fragments, and 9 unique Qualitas Java files from 6 different projects.

Since we are not certain about the direction of copying in the B-classified pairs, we checked the modification time of each Java file in Qualitas project and compare it to the timestamp of Stackoverflow answers. We found that all Stackoverflow code fragments were posted after their respectively similar Java files in Qualitas project. This means that the copying can only be either (1) Q → S or (2) from a third source to both S and Q independently.

4.4 Non-agreement based clone pairs

In the preliminary stage of our experiment, we found that there are 41 Stackoverflow fragments reported by Simian with default configurations. However, only 10 of them appear in the new results using tool’s agreement. Thus, we further investigated the clone pairs reported by Simian and NiCad but *without* an agreement.

With our 4 settings, we decided to investigate only 2 settings, Simian_{df}, and NiCad_{df}, and drop Simian_{fse13} and NiCad_{fse13} due to their large number of false positives as shown in Table 8 and 9. With the 2 selected settings, we investigated clone pairs having the minimum clone size of 10 SLOC as they are meaningful and tend to be real clone in modern clone detection [4].

For Simian_{df}, there were 9,383 clone pairs reported by the tool. Out of 9,383 pairs, 140 of them are the ones found in *ok-pairs* using agreement-based detection. We filtered the results further by removing false positives such as similar equals(), hashCode() methods, getters and setters out by using regular expression. We managed to remove 8,956 pairs using this method. Eventually, there were 287 clone pairs remaining for manual investigation. For NiCad_{df}, we obtained 7,040 clone pairs to look at which is infeasible for manual investigation. Hence, result filtering was also needed. However, regular expressions could not be used effectively as in Simian’s case since NiCad allowed clones that are different at keywords/variable names or even added/deleted lines. So we decided to filter the results by selecting pairs that pass

Table 3: 63 Qualitas projects (new versions checked on 2016-09-27)

Projects	Old version	New versions	Latest change	Repo.	License	Notes
antlr4	4.0	4.5.4	25/09/2016	git	BSD	
apache-ant	1.8.4	1.10.0	09/04/2016	git	Apache2.0	
argouml	0.34	0.35.4	11/01/2015	svn	Eclipse 1.0	
artofillusion	2.8.1	3.0.2	27/08/2016	svn	GPL 2.0	
aspectj	1.6.9	1.8.9	12/05/2016	git	Eclipse 1.0	
axion	1.0-M2	-	08/03/2013	-	Proprietary (BSD/Apache-style)	
batik	1.7	1.9.0	11/05/2016	svn	Apache , v.2.0	
c-jdbc	2.0.2	-	16/09/2005	-	GLGPL 2.1	
castor	1.3.1	1.4.2	17/08/2016	git	Apache 2.0	
cayenne	3.0.1	4.0.M4	26/09/2016	git	Apache 2.0	
checkstyle	5.1	7.2	23/09/2016	git	GLGPL 2.1 & Apache 2.0	<i>Cli, Logging and Beanutils</i> packages are from the Apache Commons project.
cobertura	1.9.4.1	2.1.2	01/06/2016	git	GPL 2.0	
colt	1.2.0	-	09/09/2014	-	Proprietary (CERN)	Found multithreaded v.
columba	1.4	-	20/04/2007	-	Mozilla 1.1	
commons-collections	3.2.1	4.2	12/09/2016	svn	Apache 2.0	
compiere	330	-	-	-	GPL 2.0	No longer OSS
db-derby	10.6.1.0	10.12.1	13/08/2016	svn	Apache 2.0	
displaytag	1.2	2.0	17/08/2014	svn	MIT	
drawswf	1.2.9	-	02/04/2013	-	GPL 2.0	
drjava	20100913-r5387	???	03/09/2014	svn	BSD	Build to see version?
exoportat	???	???		git	GLGPL 3.0 & proprietary	Too many new projects
emma	2.0.5312	2.0.5312	09/05/2013	-	Common 1.0	
findbugs	1.3.9	3.0.1	06/03/2015	-	GLGPL 2.0	
fit-java	1.1	-	04/06/2013	-	GPL 2.0	
fitlibrary	20100806	???	29/07/2014	git	GPL 2.0	
freecol	0.10.7	0.11.6	26/09/2016	git	GPL 2.0	
freecs	1.3.20100406	-	22/04/2013	-	GPL 3.0	
freemind	0.9.0	1.0.0	16/08/2016	git	GPL 2.0+	
galleon	2.3.0	2.5.6	29/04/2013	-	GPL 2.0	
ganttproject	2.0.9	2.8.1	16/08/2016	git	GPL 3.0	
geotools	2.7-M3	16	27/09/2016	git	GLGPL 2.0	
hadoop	1.0.0	3.0.0-alpha2	26/09/2016	git	Apache 2.0	
heritrix	1.14.4	-	05/06/2013	-	GLGPL 2.1	
hibernate	4.2.2	5.2.3	22/09/2016	git	GLGPL 2.1+	
hsqldb	2.0.0	2.3.4	13/09/2016	svn	BSD	
htmlunit	2.8	2.24	26/09/2016	svn	Apache 2.0	
ireport	3.7.5	-	28/05/2014	-	Affero GLGPL 3.0	
itext	5.0.3	5.5.9	27/09/2016	git	Affero GLGPL 3.0	
informa	0.7.0-alpha2	-	07/11/2008	-	GLGPL 2.1 & Apache Software 1.1	
ivatagroupware	0.11.3	-	27/02/2013	-	GPL 2.0	
jfin_datemath	R1_0.1	-	25/04/2013	-	GPL 2.0	
joggplayer	114s	-	15/04/2013	-	GPL 2.0	
jag	6.1	6.2	08/04/2013	-	GPL 2.0 & BSD	BSD is for libraries.
james	2.2.0	2.3.2.1	14/08/2015	-	Apache 2.0	
jasml	0.10	-	08/03/2013	-	Apache Software	
jasperreports	3.7.4	6.3.1	27/09/2016	git	GLGPL 3.0	
javacc	5.0.0	7.0.0	15/08/2016	svn	Proprietary (Sun)	
jboss (wildfly)	5.1.0.GA	11.0.0.Alpha1	27/09/2016	git	GLGPL 2.1	Renamed to Wildfly.
jchempaint	3.0.1	3.4	01/09/2016	git	GLGPL 2.1+	
jedit	4.3.2	5.3.1	20/09/2016	svn	GPL 2.0	
jena	2.6.3	3.1.1	16/09/2016	git	Apache 2.0	
jext	5.0	-	18/08/2004	-	GPL 2.0	
jfreechart	1.0.13	1.5.0	29/08/2016	git	GLGPL 2.0	
jgraph	5.13.0.0	3.6.0.0	07/09/2016	git	Proprietary (mx-Graph)	
jgraphpad	5.10.0.2	-	10/11/2006	-	GPL & GLGPL (derivatives)	
jgrapht	0.8.1	1.0.1	23/09/2016	git	GLGPL 2.1 & Eclipse 1.0	
jgroups	2.10.0.GA	4.0.0	26/09/2016	git	Apache 2.0	
jmoney	0.4.4	???	27/12/2015	git	GPL 2.0	
jpase	0.96	-	29/07/2004	-	GLGPL 2.1	
jpgf	1.5.1	???	13/01/2012	-	Apache 2.0	
junit	4.11	4.12	04/12/2014	git	Eclipse 1.0	
shiftone-jrat	0.6	1-beta-1	17/11/2007	svn	GLGPL 2.0	
vuze	4812	5730	23/09/2016	svn	GPL 2.0	

Table 4: No. of projects in Qualitas Original (Qualitas-*O*) and New (Qualitas-*N*) successfully analysed by Simian and NiCad

Qualitas- <i>O</i>			Qualitas- <i>N</i>		
Simian _{df/fse13}	NiCad _{df}	NiCad _{fse13}	Simian _{df/fse13}	NiCad _{df}	NiCad _{fse13}
63	57	46	44	40	34
	6 clustering failed cayenne checkstyle db-derby geotools iReport hibernate	13 clustering failed cayenne checkstyle db-derby geotools iReport ArgoUML castor drjava ganttproject ivatagroupware jasperreports jboss jchempaint		4 clustering failed jboss (wildfly) hadoop db-derby hibernate	6 clustering failed ArgoUML checkstyle db-derby cayenne jena geotools
		4 renaming failed Vuze aspectj eXoPortal hibernate			4 renaming failed Vuze hadoop jboss (wildfly) hibernate

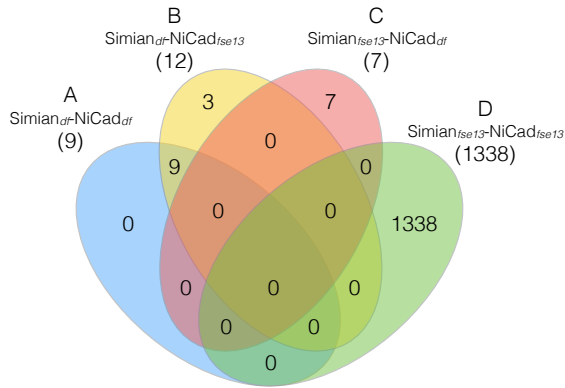


Figure 1: Qualitas-*O* good-match(0.7) pairs

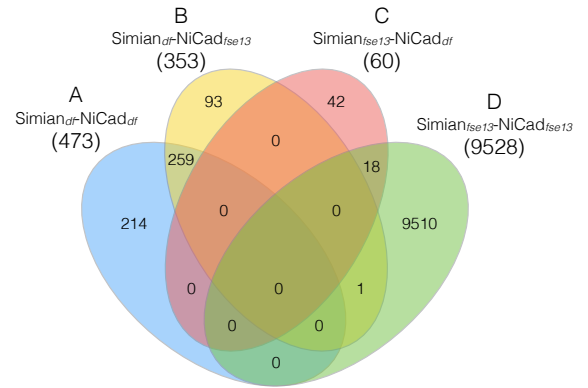


Figure 2: Qualitas-*O* ok-match(0.7) pairs

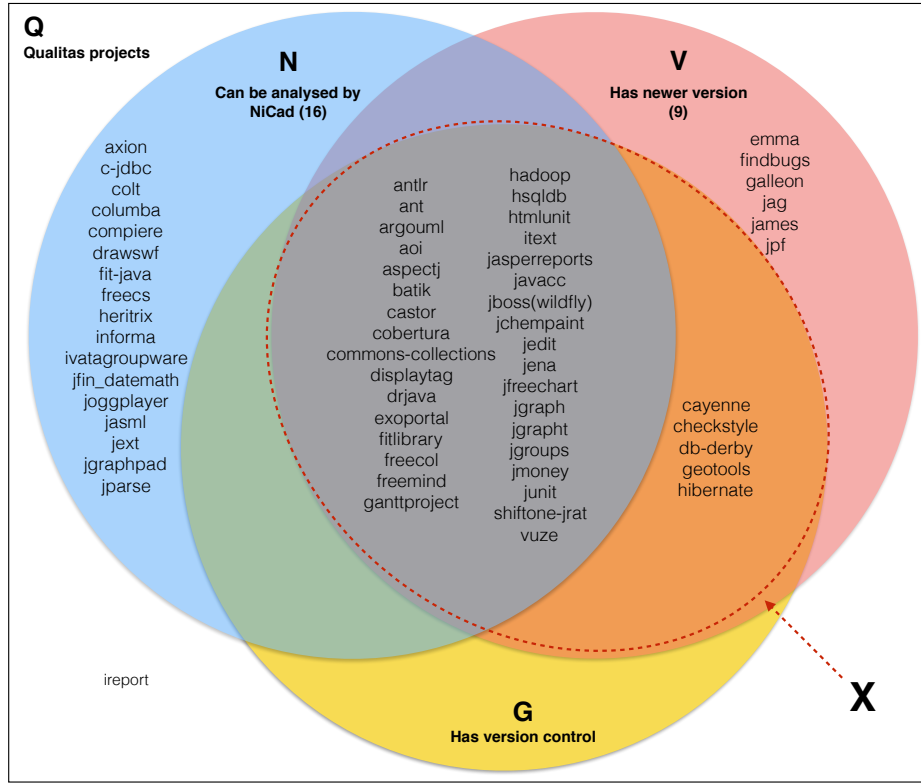


Figure 3: Qualitas projects categorised by NiCad’s results, existence of newer versions, and version control

Table 5: Distribution of agreement-based clone pairs reported using Bellon’s criteria

Tool		Qualitas- <i>O</i>	
Simian	NiCad	<i>good-match</i>	<i>ok-match</i>
<i>default</i>	<i>default</i>	9	473
<i>default</i>	<i>fse13</i>	12	353
<i>fse13</i>	<i>default</i>	7	60
<i>fse13</i>	<i>fse13</i>	1,338	9528
Total		1,366	10,414
Total (unique)		1,357	10,139

stricter clone criteria with $UPI = 0.2$. By reducing the UPI to 0.2, there were totally 166 pairs left. Out of 166, 52 are *ok*-pairs and 114 are remaining pairs for manual check (18 pairs are from *cayenne* and *iReport* that could not be analysed using $UPI = 0.3$). The statistics of the clones and classification results are reported in Table 10 and 11.

4.5 Manual investigation of non-agreement based clone pairs

We performed manual investigation of the clone pairs reported by Simian_{df} and NiCad_{df} in the same way as the agreement-based clone pairs. The results of the manual investigation is reported in Table 11.

Table 12: Numbers of true online clone pairs ($A+A'+B+C$) found by manual investigation

Tool	A	A'	B	C	Total
<i>good</i> -pairs	1	0	1	3	5
<i>ok</i> -pairs	8	0	23	8	39
Simian _{df} pairs	35	0	89	7	131
NiCad _{df} pairs	4	0	5	0	9
Total	48	0	118	18	184

5. EFFECTS OF ONLINE CODE CLONE

5.1 Issue 1: outdated online code

After located and classified all the online clone pairs, we are now interested in analysing the true online clone pairs that are copied in the direction of $Q \rightarrow S$ (class-A online clone pairs) in Table 12 which results in 48 pairs selected. We restricted it further to only the ones having versioning system so we can trace changes made to these clone pairs. Fortunately, all of the pairs were from projects with either git or svn so we did not remove any pair from this set.

Our intuition behind this issue comes from a situation where a piece of code has been copied from a Qualitas project and posted on Stackoverflow. Later, that piece of code has been modified further to accommodate changes in the projects (or any other reasons). However, even the code in Qualitas project is already updated, the one posted on Stackoverflow is not changed. This results in outdated online code which can cause problems when programmers copy and use it in their projects.

Table 6: Classifications of clone creation

Category	Descriptions
A	Code in Stackoverflow is copied from Qualitas ($Q \rightarrow S$).
A'	Code in Qualitas is copied from Stackoverflow ($S \rightarrow Q$).
B	Code is copied either from each other or a third source (unknown) ($S \leftrightarrow Q \vee (T \rightarrow S \wedge T \rightarrow Q)$).
C	Code in both places are copied from a third source T (known) ($T \rightarrow S \wedge T \rightarrow Q$).
D	Code is a boiler-plate or IDE auto-generated.
E	Code in both places initialise a similar/the same object; extend the same class/its subclass; implement the same interface.
F	Accidental similarity, false clone

Table 7: Qualitas-*O*: Classification results of *good*- and *ok*-match pairs which excludes the subsumed *good*-match and Simian_{fse13}-NiCad_{fse13} pairs.

Classificaiton	A	A'	B	C	Sum	S _u	Q _u	Q _{up}	D	E	F	Sum	S _u	Q _u	Q _{up}	Total	S _u	Q _u	Q _{up}
<i>good-match</i> (0.7)	1	0	1	3	5	5	4	4	26	6	1320	1352	56	402	31	1357	61	406	32
<i>ok-match</i> (0.7)	8	0	23	8	39	8	9	6	480	28	61	569	76	60	16	608	83	68	19

Table 8: Qualitas-*O*: Distribution of classification category A–F according to *good*-match pairs

Category	A	A'	B	C	D	E	F	Total
Simian _{df} -NiCad _{df}	1	0	1	3	0	4	0	9
Simian _{df} -NiCad _{fse13}	1	0	1	3	1	5	1	12
Simian _{fse13} -NiCad _{df}	0	0	0	0	7	0	0	7
Simian _{fse13} -NiCad _{fse13}	0	0	0	0	18	1	1,319	1,338
Total	2	0	2	6	26	10	1,320	1,366
Total (unique)	1	0	1	3	26	6	1,320	1,352

Table 9: Qualitas-*O*: Distribution of classification category A–F according to the *ok*-match pairs

Category	A	A'	B	C	D	E	F	Total
Simian _{df} -NiCad _{df}	3	0	10	6	433	5	7	464
Simian _{df} -NiCad _{fse13}	8	0	22	4	250	25	32	341
Simian _{fse13} -NiCad _{df}	0	0	0	0	29	0	24	53
Total	11	0	32	10	712	30	63	858
Total (unique)	8	0	23	8	480	28	61	608

Table 10: Statistics of Simian_{df} and NiCad_{df} clone pairs.

Tool	Clone pairs	<i>ok</i> -pairs	filtered pairs	remaining pairs
Simian _{df}	9383	140	8956	287
NiCad _{df}	7040	226	6700	114

Table 11: Classification results of 292 Simian_{df} and 114 NiCad_{df} individual unique pairs.

Tool/Classification	A	A'	B	C	Sum	S _u	Q _u	Q _{up}	D	E	F	Sum	S _u	Q _u	Q _{up}	Total	S _u	Q _u	Q _{up}
Simian _{df}	35	0	89	7	133	68	57	23	13	10	133	159	39	69	23	287	103	121	31
NiCad _{df}	4	0	5	0	9	9	5	4	24	3	78	105	41	39	12	114	48	44	14

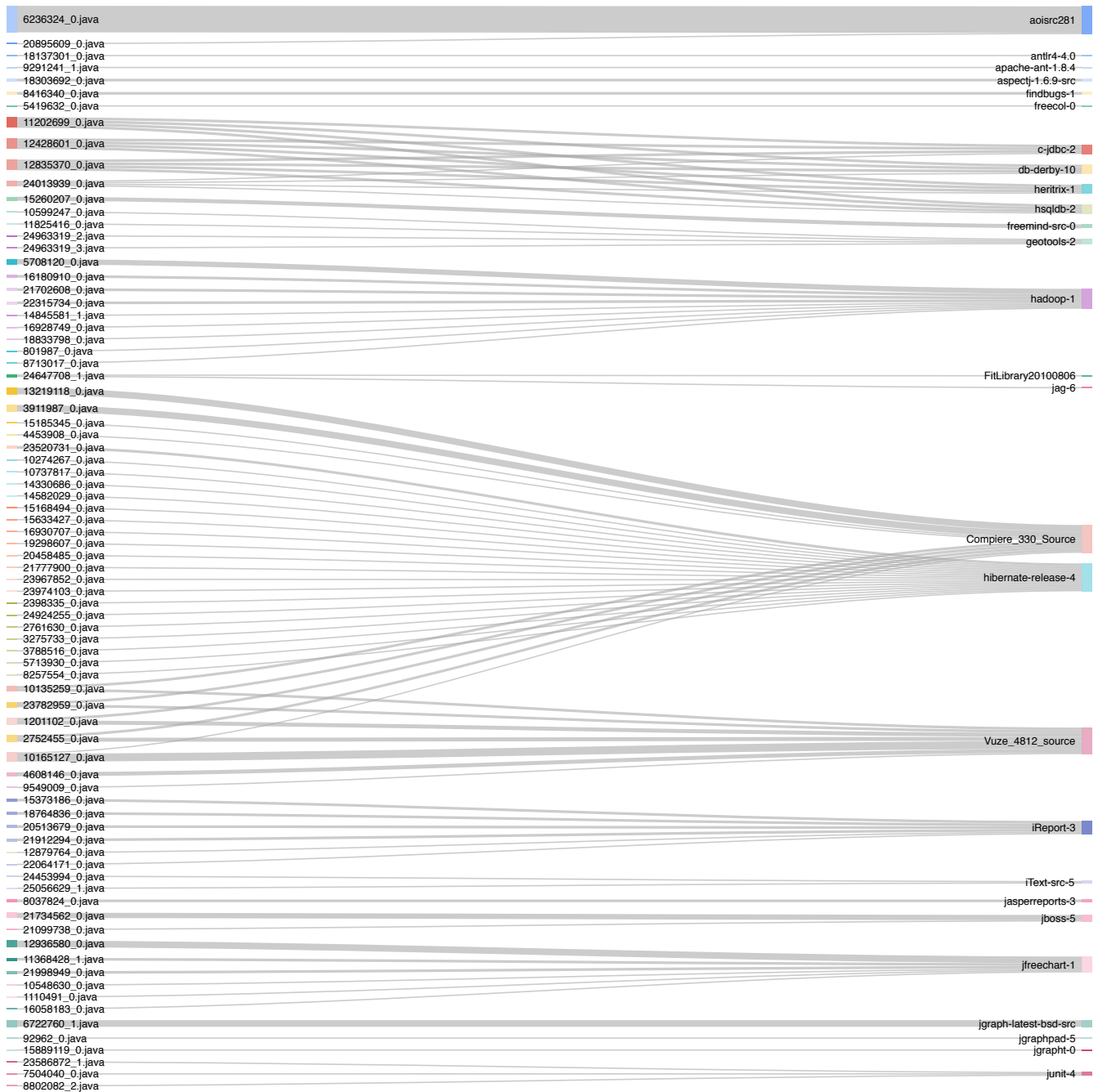


Figure 4: Relationships between 184 true online code clone found between Stackoverflow and Qualitas projects

Table 13: Results of matching the original 41 Simian(default) pairs in the pretty-printed result sets

Settings	Found	Not found
Simian _{df}	40	1*
Simian _{fse13}	0	41
NiCad _{df}	17	24
NiCad _{fse13}	24	17

5.2 Issue 2: software licensing violation

FIXME: Add more content here

6. INVESTIGATION OF MISSING A/B CLONE PAIRS REPORTED BY SIMIAN_{DF}

We investigated the 41 clone pairs previously reported by Simian with default configurations and manually investigated. The 41 pairs were searched for in 4 new results sets: Simian_{df}, Simian_{fse13}, NiCad_{df}, NiCad_{fse13}. The investigation results are shown in Table 13.

The single missing Stackoverflow fragment (19051537_0.java) (denoted by *) is one of the 11 false clones generated by Simian. It is removed from the results of the pretty-printed version because it is an outlier. The rest are missing because of different parameter settings.

7. SIMIAN’S PARAMETERS

We have carefully investigated the effects of the Simian’s parameter `-balanceSquareBrackets+`. I found that it works in the expected way of handling a pair of brackets ([,]) that span over multiple lines. For example, the two code fragments in Figure 5 would match by having `-balanceSquareBrackets+` enabled. However, the `-balanceSquareBrackets+` parameter only works on a small testing environment having toy programs or only small pairs from the full datasets. It does not work with the full complete set of 144,075 Stackoverflow fragments and Qualitas projects. Please find the summary of all the testing scenarios in Table 14.

8. THREATS TO VALIDITY

9. CONCLUSIONS

This paragraph will end the body of this sample document. Remember that you might still have Acknowledgments or Appendices; brief samples of these follow. There is still the Bibliography to deal with; and we will make a disclaimer about that here: with the exception of the reference to the L^AT_EX book, the citations in this paper are to articles which have nothing to do with the present subject and are used as examples only.

10. ACKNOWLEDGMENTS

This section is optional; it is a location for you to acknowledge grants, funding, editing assistance and what have you. In the present case, for example, the authors would like to thank Gerald Murray of ACM for his help in codifying this *Author’s Guide* and the `.cls` and `.tex` files that it describes.

11. REFERENCES

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<pre> 1 public class MagicSquare { 2 private int[][] square; 3 private boolean[] possible; 4 private int totalSqs; 5 private int sum; 6 private int numsquares; 7 public static void main (String[] args) { 8 MagicSquare m = new MagicSquare (3); 9 10 </pre>	<pre> public class MagicSquare2 { private int[][] square; private boolean[] possible; private int totalSqs; private int sum; private int numsquares; public static void main (String[] args) { MagicSquare m = new MagicSquare (3); } } </pre>
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Figure 5: Two identical fragments with only differences in locations of the square brackets. All 7 lines are reported by Simian if `-balanceSquareBrackets+` is enabled. If not, the clone pairs is reported as (MagicSquare.java [3,8], MagicSquare2.java [5,10]).

Table 14: Simian’s `-balanceSquareBrackets+` (`-bsb+`) is observed to have unpredictable behaviours when running against big datasets. CP_2 means the reported clone(s) do not contain lines having dislocated brackets (L_b) (i.e. $CP_2 = CP_1 - L_b$).

Project 1	Project 2	Dislocated brackets?	-bsb+	Clones pair reported
<i>Only run Simian against the pair</i>				
MagicSquare.java	MagicSquare_exact_copy.java	no	0,1	CP_1
MagicSquare.java	MagicSquare2.java	yes	0	CP_2
MagicSquare.java	MagicSquare2.java	yes	1	CP_1
stackoverflow/4298836_0.java	Qualitas/aoisrc281/./ExprModule.java	no	0	CP_3
stackoverflow/4298836_0.java	Qualitas/aoisrc281/./ExprModule.java	no	1	CP_3
stackoverflow/4533682_1.java	Qualitas/cobertura-1/./TouchCollector.java	no	0	CP_4
stackoverflow/4533682_1.java	Qualitas/cobertura-1/./TouchCollector.java	no	1	CP_4
<i>Run Simian against the complete stackoverflow data and the project</i>				
stackoverflow/4298836_0.java	Qualitas/aoisrc281/./ExprModule.java	no	0	CP_3
stackoverflow/4298836_0.java	Qualitas/aoisrc281/./ExprModule.java	no	1	–
stackoverflow/4533682_1.java	Qualitas/cobertura-1/./TouchCollector.java	no	0	CP_4
stackoverflow/4533682_1.java	Qualitas/cobertura-1/./TouchCollector.java	no	1	–