One Ring to Rule Them All
A Textual-based Technique for Code and Test Smells Detection
– Complete Results Achieved in Our Study –

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Because of limit space, in our paper we reported only the results in terms of precision, recall, and f-measure, missing the informations about the actual number of instances correctly detected and missed by our approach and by the competitive ones. In this appendix, we show the complete analysis of our study aimed at evaluating the accuracy of (i) our proposed approach, and (ii) the structural detectors we used for the comparison. Specifically, we report (i) the number of instances detected by TACO and by the competitive approach (column *Det*), (ii) the number of true and false positive instances found by a given technique (columns *TP* and *FP*, respectively), and (iii) accuracy metrics for each approach involved in a comparison (colums, *Prec.* stays for Precision; *Rec.* for Recall; *F-M* for F-Measure). It is worth noting that, in the cases of test smells, we report the results achieved on all the projects for which we have at least one test suite, i.e., 13 systems out of the total 20.

TABLE I
LONG METHOD - TACO ACCURACY COMPARED TO DECOR.

	#Smell	TACO						DECOR					
Project	Instances	Det.	TP	FP	Prec.	Rec.	F-M	Det.	TP	FP	Prec.	Rec.	F-M
ArgoUML	49	60	47	13	78%	96%	86%	69	34	35	49%	69%	58%
Apache Ant	52	73	50	23	68%	96%	80%	46	29	17	63%	56%	59%
aTunes	11	12	9	3	75%	81%	78%	16	2	14	13%	18%	15%
Apache Cassandra	10	11	8	3	73%	80%	76%	12	6	6	50%	60%	55%
Eclipse Core	89	93	69	24	74%	78%	76%	304	73	231	24%	82%	37%
FreeMind	12	13	10	3	77%	83%	80%	12	8	4	67%	67%	67%
HSQLDB	75	92	64	28	70%	85%	77%	97	52	45	54%	69%	60%
Apache Hive	53	64	45	19	70%	85%	77%	75	35	40	47%	66%	55%
Apache Ivy	18	21	16	5	76%	89%	82%	12	9	3	75%	50%	60%
Apache Log4j	4	4	2	2	50%	50%	50%	5	2	3	40%	50%	44%
Apache Lucene	82	101	66	35	65%	80%	72%	172	58	114	34%	71%	46%
JEdit	12	16	10	6	63%	83%	71%	19	6	13	32%	50%	39%
JHotDraw	13	18	11	7	61%	85%	71%	36	5	31	14%	38%	20%
JVLT	7	8	5	3	63%	71%	67%	5	3	2	60%	43%	50%
Apache Karaf	21	24	19	5	79%	90%	84%	14	10	4	71%	48%	57%
Apache Nutch	17	21	15	6	71%	88%	79%	12	7	5	58%	41%	48%
Apache Pig	33	38	28	10	74%	85%	79%	111	21	90	19%	64%	29%
Apache Qpid	39	46	32	14	70%	82%	75%	53	22	31	42%	56%	48%
Apache Struts	27	37	23	14	62%	85%	72%	32	12	20	38%	44%	41%
Apache Xerces	27	30	23	7	77%	85%	81%	74	23	51	31%	85%	46%
Overall	**651**	**782**	**552**	**230**	**71%**	**85%**	**77%**	**1,176**	**417**	**759**	**35%**	**64%**	**46%**

TABLE II
FEATURE ENVY - TACO ACCURACY COMPARED TO JDEODORANT.

	#Smell	TACO						JDeodorant					
Project	Instances	Det.	TP	FP	Prec.	Rec.	F-M	Det.	TP	FP	Prec.	Rec.	F-M
ArgoUML	5	4	3	1	75%	60%	67%	7	4	3	57%	80%	67%
Apache Ant	8	11	6	5	55%	75%	63%	13	2	11	15%	25%	19%
aTunes	8	11	6	5	55%	75%	63%	16	6	10	34%	75%	50%
Apache Cassandra	28	23	18	5	78%	64%	71%	28	28	0	100%	100%	100%
Eclipse Core	3	5	2	3	40%	67%	50%	0	0	0	0%	0%	0%
FreeMind	1	3	0	3	0%	0%	0%	5	0	5	0%	0%	0%
HSQLDB	14	14	8	6	57%	57%	57%	19	9	10	47%	64%	55%
Apache Hive	22	17	15	2	88%	68%	77%	19	17	2	89%	77%	83%
Apache Ivy	17	15	9	6	60%	53%	57%	13	10	3	77%	59%	67%
Apache Log4j	3	5	1	4	20%	34%	25%	9	2	7	22%	67%	34%
Apache Lucene	26	32	19	13	59%	73%	66%	45	23	22	51%	88%	65%
JEdit	10	8	6	2	75%	60%	67%	3	3	0	100%	30%	46%
JHotDraw	8	13	7	6	54%	88%	67%	9	6	3	67%	75%	71%
JVLT	1	3	1	2	34%	100%	50%	2	1	1	50%	100%	67%
Apache Karaf	14	18	11	7	61%	79%	69%	16	12	4	75%	86%	80%
Apache Nutch	11	9	6	3	67%	55%	60%	13	7	6	54%	64%	58%
Apache Pig	7	9	5	4	56%	71%	63%	7	4	3	57%	57%	57%
Apache Qpid	15	18	13	5	72%	87%	79%	15	11	4	73%	73%	73%
Apache Struts	19	16	12	4	75%	63%	69%	22	13	9	59%	68%	63%
Apache Xerces	8	9	6	3	67%	75%	71%	8	5	3	63%	63%	63%
Overall	**228**	**243**	**154**	**89**	**63%**	**68%**	**65%**	**269**	**163**	**106**	**61%**	**71%**	**66%**

TABLE III
BLOB - TACO ACCURACY COMPARED TO DECOR.

	#Smell	TACO						DECOR					
Project	Instances	Det.	TP	FP	Prec.	Rec.	F-M	Det.	TP	FP	Prec.	Rec.	F-M
ArgoUML	30	42	28	14	67%	93%	77%	23	15	8	65%	50%	57%
Apache Ant	31	37	25	12	68%	81%	74%	21	17	4	81%	55%	65%
aTunes	9	11	7	4	64%	78%	70%	4	3	1	75%	34%	46%
Apache Cassandra	22	26	20	6	77%	91%	83%	5	4	1	80%	18%	30%
Eclipse Core	43	56	35	21	63%	81%	71%	64	31	33	48%	72%	52%
FreeMind	11	12	9	3	75%	82%	78%	7	7	0	100%	64%	78%
HSQLDB	23	24	18	6	75%	78%	77%	32	18	14	57%	78%	66%
Apache Hive	27	24	17	7	71%	63%	67%	18	13	5	72%	48%	58%
Apache Ivy	10	10	8	2	80%	80%	80%	3	3	0	100%	30%	46%
Apache Log4j	5	6	4	2	67%	80%	73%	3	1	2	34%	20%	25%
Apache Lucene	27	30	22	8	74%	81%	77%	27	18	9	67%	67%	67%
JEdit	15	13	12	1	92%	80%	86%	13	11	2	85%	74%	79%
JHotDraw	13	14	11	3	79%	85%	81%	11	8	3	73%	62%	67%
JVLT	3	2	1	1	50%	34%	40%	1	1	0	100%	34%	50%
Apache Karaf	5	4	3	1	75%	60%	67%	4	3	1	75%	60%	67%
Apache Nutch	2	2	1	1	50%	50%	50%	2	1	1	50%	50%	50%
Apache Pig	7	6	4	2	67%	57%	62%	12	5	7	42%	71%	53%
Apache Qpid	29	34	27	7	79%	93%	86%	15	12	3	80%	41%	55%
Apache Struts	13	17	11	6	65%	85%	73%	6	4	2	67%	31%	42%
Apache Xerces	16	20	14	6	70%	88%	78%	22	13	9	59%	81%	68%
Overall	**338**	**388**	**276**	**112**	**71%**	**82%**	**76%**	**292**	**187**	**105**	**64%**	**55%**	**59%**

TABLE IV
GENERAL FIXTURE - TACO ACCURACY COMPARED TO THE STRUCTURAL TECHNIQUE PROPOSED BY VAN ROMPAEY *et al.*

	#Smell	TACO						ST					
Project	Instances	Det.	TP	FP	Prec.	Rec.	F-M	Det.	TP	FP	Prec.	Rec.	F-M
Apache Ant	1	2	1	1	50%	100%	67%	1	0	1	0%	0%	0%
Apache Cassandra	0	0	0	0	-	-	-	0	0	0	-	-	-
FreeMind	0	0	0	0	-	-	-	0	0	0	-	-	-
HSQLDB	1	3	1	2	34%	100%	50%	1	0	1	0%	0%	0%
Apache Hive	1	3	1	2	34%	100%	50%	2	0	2	0%	0%	0%
Apache Ivy	2	2	1	1	50%	50%	50%	1	0	1	0%	0%	0%
Apache Log4j	0	0	0	0	-	-	-	0	0	0	-	-	-
Apache Lucene	0	0	0	0	-	-	-	0	0	0	-	-	-
Apache Karaf	1	3	1	2	34%	100%	50%	3	0	3	0%	0%	0%
Apache Nutch	0	0	0	0	-	-	-	0	0	0	-	-	-
Apache Pig	15	17	12	5	71%	80%	75%	14	5	9	36%	34%	35%
Apache Struts	3	3	2	1	67%	67%	67%	4	1	3	25%	34%	29%
Apache Qpid	1	2	1	1	50%	100%	67%	2	0	2	-	-	-
Overall	**25**	**35**	**20**	**15**	**57%**	**80%**	**67%**	**28**	**6**	**22**	**21%**	**24%**	**23%**

TABLE V
EAGER TEST - TACO ACCURACY COMPARED TO THE STRUCTURAL TECHNIQUE PROPOSED BY VAN ROMPAEY *et al.*

	#Smell	TACO						ST					
Project	Instances	Det.	TP	FP	Prec.	Rec.	F-M	Det.	TP	FP	Prec.	Rec.	F-M
Apache Ant	34	37	29	8	78%	85%	82%	23	15	8	65%	44%	53%
Apache Cassandra	32	36	29	7	81%	91%	85%	24	14	10	58%	44%	50%
FreeMind	0	0	0	0	-	-	-	0	0	0	-	-	-
HSQLDB	2	1	1	0	100%	50%	67%	1	0	1	0%	0%	0%
Apache Hive	4	3	2	1	67%	50%	57%	3	1	2	34%	25%	29%
Apache Ivy	3	3	2	1	67%	67%	67%	1	1	0	100%	34%	50%
Apache Log4j	3	0	0	0	-	-	-	0	0	0	-	-	-
Apache Lucene	98	102	77	25	75%	79%	77%	57	36	21	63%	37%	46%
Apache Karaf	4	4	3	1	75%	75%	75%	4	1	3	25%	25%	25%
Apache Nutch	7	8	6	2	75%	86%	80%	6	3	3	50%	43%	46%
Apache Pig	108	105	78	27	74%	72%	73%	76	44	32	58%	41%	48%
Apache Struts	19	16	12	4	75%	63%	69%	22	13	9	59%	68%	63%
Apache Qpid	6	5	3	2	60%	50%	55%	4	2	2	50%	34%	40
Overall	**300**	**307**	**231**	**76**	**75%**	**77%**	**76%**	**202**	**117**	**85**	**58%**	**39%**	**47%**