

# **Project Intermediate Report**

Software Reengineering

Van Muylder Ben & Geeraert Lander

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## 0 Introduction

For this intermediate report, we had to report upon the tools we will be using, have been using and have used to analyse how we want to refactor the project.

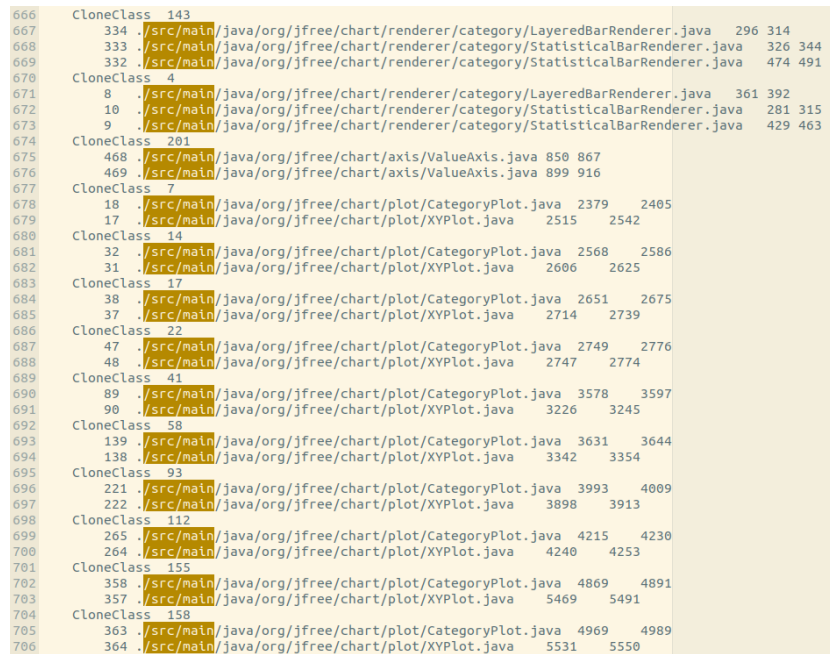
For each subsection, we provide a small explanation of which tools we may have used so far, or are planning to use, as well as a screenshot of those tools.

## 1 Tools Used

First and foremost we want to mention that we often use JetBrains IntelliJ and Codescene as starting points as they both provide functionality for multiple of the below mentioned subsections.

### 1.1 Duplicate Code

As an initial tool, we'll use IntelliJ (which provides simple assisting messages when it detects duplicate code) on the relevant parts of the code. Furthermore we'll use iClones to help us with further detection of duplicate code.



666	CloneClass	143		
667	334	/src/main/java/org/jfree/chart/renderer/category/LayeredBarRenderer.java	296	314
668	333	/src/main/java/org/jfree/chart/renderer/category/StatisticalBarRenderer.java	326	344
669	332	/src/main/java/org/jfree/chart/renderer/category/StatisticalBarRenderer.java	474	491
670	CloneClass	4		
671	8	/src/main/java/org/jfree/chart/renderer/category/LayeredBarRenderer.java	361	392
672	10	/src/main/java/org/jfree/chart/renderer/category/StatisticalBarRenderer.java	281	315
673	9	/src/main/java/org/jfree/chart/renderer/category/StatisticalBarRenderer.java	429	463
674	CloneClass	201		
675	468	/src/main/java/org/jfree/chart/axis/ValueAxis.java	850	867
676	469	/src/main/java/org/jfree/chart/axis/ValueAxis.java	899	916
677	CloneClass	7		
678	18	/src/main/java/org/jfree/chart/plot/CategoryPlot.java	2379	2405
679	17	/src/main/java/org/jfree/chart/plot/XYPlot.java	2515	2542
680	CloneClass	14		
681	32	/src/main/java/org/jfree/chart/plot/CategoryPlot.java	2568	2586
682	31	/src/main/java/org/jfree/chart/plot/XYPlot.java	2606	2625
683	CloneClass	17		
684	38	/src/main/java/org/jfree/chart/plot/CategoryPlot.java	2651	2675
685	37	/src/main/java/org/jfree/chart/plot/XYPlot.java	2714	2739
686	CloneClass	22		
687	47	/src/main/java/org/jfree/chart/plot/CategoryPlot.java	2749	2776
688	48	/src/main/java/org/jfree/chart/plot/XYPlot.java	2747	2774
689	CloneClass	41		
690	89	/src/main/java/org/jfree/chart/plot/CategoryPlot.java	3578	3597
691	90	/src/main/java/org/jfree/chart/plot/XYPlot.java	3226	3245
692	CloneClass	58		
693	139	/src/main/java/org/jfree/chart/plot/CategoryPlot.java	3631	3644
694	138	/src/main/java/org/jfree/chart/plot/XYPlot.java	3342	3354
695	CloneClass	93		
696	221	/src/main/java/org/jfree/chart/plot/CategoryPlot.java	3993	4009
697	222	/src/main/java/org/jfree/chart/plot/XYPlot.java	3898	3913
698	CloneClass	112		
699	265	/src/main/java/org/jfree/chart/plot/CategoryPlot.java	4215	4230
700	264	/src/main/java/org/jfree/chart/plot/XYPlot.java	4240	4253
701	CloneClass	155		
702	358	/src/main/java/org/jfree/chart/plot/CategoryPlot.java	4869	4891
703	357	/src/main/java/org/jfree/chart/plot/XYPlot.java	5469	5491
704	CloneClass	158		
705	363	/src/main/java/org/jfree/chart/plot/CategoryPlot.java	4969	4989
706	364	/src/main/java/org/jfree/chart/plot/XYPlot.java	5531	5550

Figure 1: iClones Duplication Report

The duplication report showed us the presence of many duplications, mostly in the test classes, but some in the source classes as well. The question still

remains how many of these duplications will actually be relevant for this assignment.

## 1.2 Metrics and Visualisation

For metrics and visualisation (as well as other things) we will mostly be using Codescene.

### Analysis Scope

Project information, analysis scope, evolutionary data, and file content metrics.

Project	Softenering	Commits	2,559
Includes History From	2007-06-29 13:35:09 (UTC)	Entities	1,135
Analyzed At	2019-03-27 11:00:59 (UTC)	Changed entities	15,289
Duration	1 minute and 5 seconds	Authors	15
		Active Authors	2

### File Content

Language	Files	Code	Comment	Blank
Java	987	132,329	133,435	26,521
Properties	42	1,488	0	68
Markdown	1	2,188	0	236
Text	3	1,178	0	203
HTML	46	342	0	0
XML	1	216	0	29
JavaScript	5	199	45	33
Shell Script	1	5	1	1

Figure 2: Codescene Analysis

<https://codescene.io/projects/4473/jobs/12562/results>

### 1.3 Mining Repositories

We used Gsource, but as this mostly only provides a visual interactive history of your repository, this tool will be of no further use to us.

We'll also use Codescene for this.

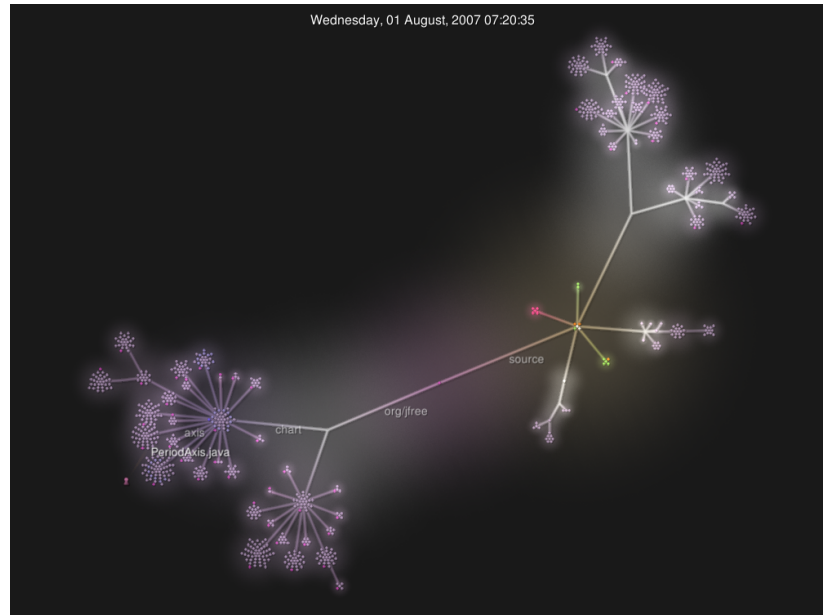


Figure 3: Gsource in process

## 1.4 Refactoring Assistants

As a baseline, we'll use IntelliJ to help us refactor (and specify what and how we should refactor) the project as well as Codescene which gives clear indications on what it thinks should be refactored. We will also have to lookup whether the assistance provided by codescene is relevant for our assignment.

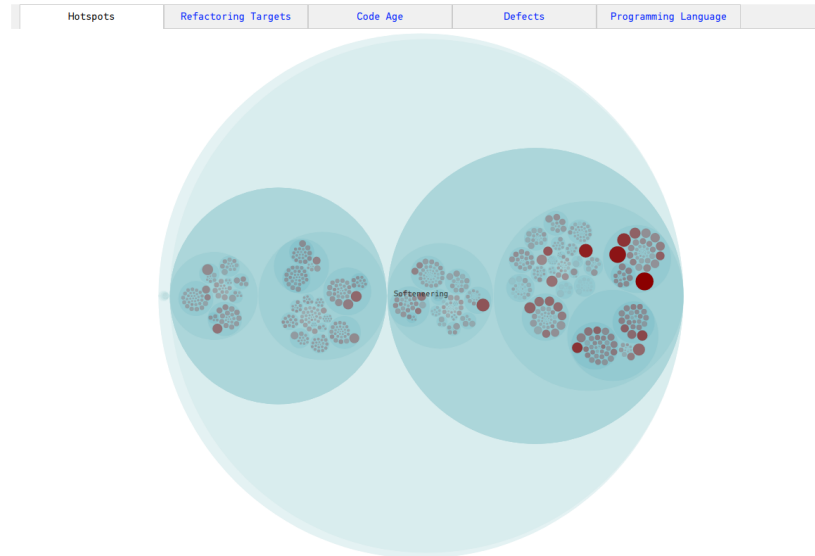


Figure 4: Codescene Hotspots

Here we can clearly see that both the classes `XYPlot` and `CategoryPlot` are highlighted as hotspots. This will most presumably be the classes most relevant for this assignment to refactor.

## 1.5 Test Coverage and Dynamic Analysis

For test coverage, we plan on using LittleDarwin to perform mutation testing on the project. However, during our assignments for the Software Testing course, we already used LittleDarwin for that project, and even on such a small project it took a fairly long while to run LittleDarwin. Because of this, and because of the other tasks, assignments, etc. we had, we have not yet used LittleDarwin.

We also used cobertura (which was already present in the project) to get an initial overview of the test coverage.

All Packages	Package	# Classes	Line Coverage	Branch Coverage	Complexity
	org.freesoft	658	87%	89%	2.47
	org.freesoft.configuration	25	100%	100%	2.474
	org.freesoft.config	20	100%	100%	2.389
	org.freesoft.block	47	100%	100%	3.625
	org.freesoft.data	21	100%	100%	2.81
	org.freesoft.helper	5	100%	100%	1.34
	org.freesoft.helper	12	100%	100%	2.008
	org.freesoft.helper	6	100%	100%	1.212
	org.freesoft.helper	14	100%	100%	2.071
	org.freesoft.helper	19	100%	100%	1
	org.freesoft.helper	7	100%	100%	1.844
	org.freesoft.helper	36	100%	100%	2.237
	org.freesoft.helper	10	100%	100%	2.703
	org.freesoft.helper	3	100%	100%	1.851
	org.freesoft.helper	46	100%	100%	2.781
	org.freesoft.helper	18	100%	100%	1.85
	org.freesoft.helper	15	100%	100%	2.462
	org.freesoft.helper	27	100%	100%	3.049
	org.freesoft.helper	44	100%	100%	3.072
	org.freesoft.helper	1	100%	100%	1
	org.freesoft.helper	9	100%	100%	3
	org.freesoft.helper	10	100%	100%	2.744
	org.freesoft.helper	24	100%	100%	2.854
	org.freesoft.helper	13	100%	100%	3.143
	org.freesoft.helper	10	100%	100%	3.405
	org.freesoft.helper	27	100%	100%	2.811
	org.freesoft.helper	7	100%	100%	2.802
	org.freesoft.helper	5	100%	100%	1.82
	org.freesoft.helper	6	100%	100%	2.332
	org.freesoft.helper	26	100%	100%	3.244
	org.freesoft.helper	1	100%	100%	2.667
	org.freesoft.helper	3	100%	100%	4.432
	org.freesoft.helper	1	100%	100%	4.5
	org.freesoft.helper	5	100%	100%	5.722
	org.freesoft.helper	6	100%	100%	1
	org.freesoft.helper	18	100%	100%	2.54
	org.freesoft.helper	27	100%	100%	2.373
	org.freesoft.helper	4	100%	100%	1.854
	org.freesoft.helper	9	100%	100%	2.687
	org.freesoft.helper	10	100%	100%	2.893

Figure 5: Cobertura Coverage Report

## 1.6 Feature Location and Traceability

Again, we will use IntelliJ as a baseline, but if it seems necessary, or if it seems that the functionality provided by IntelliJ is too limited, we'll look at other tools.

(we provide no screenshot for this subsection)