Project Intermediate Report

Software Reengineering

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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
```

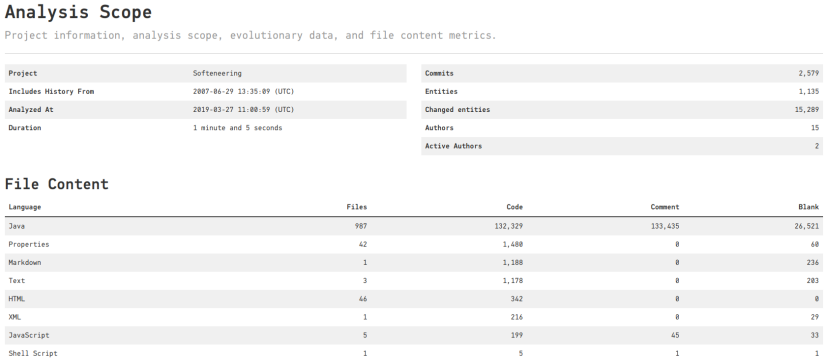
Figure 1: iClones Duplication Report

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	Softeneering	Commits	2,579
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	1,480	0	60
Markdown	1	1,188	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

The link to our codescene project is given here as well, so it can be used for further inspection. Note that the codescene project contains information about the project as we originally forked it from the original repository.

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.

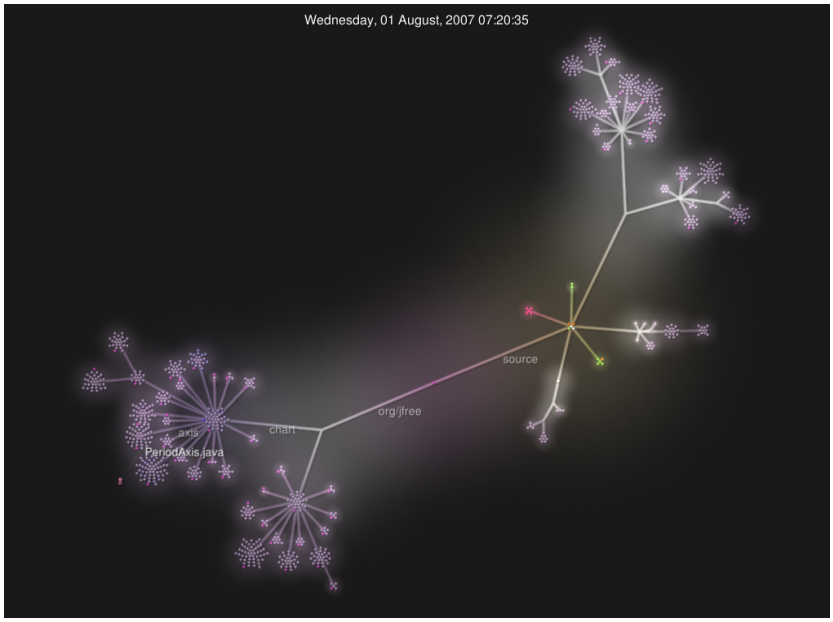


Figure 3: Gsrouce in process

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.

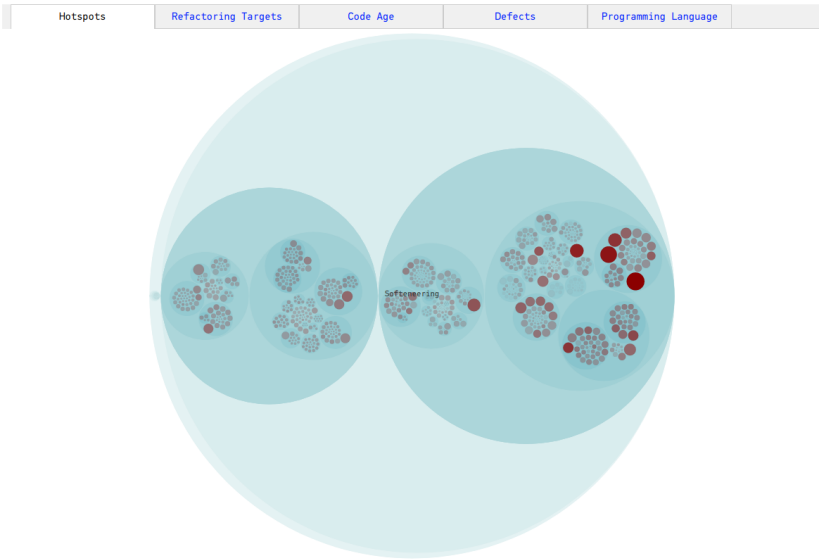


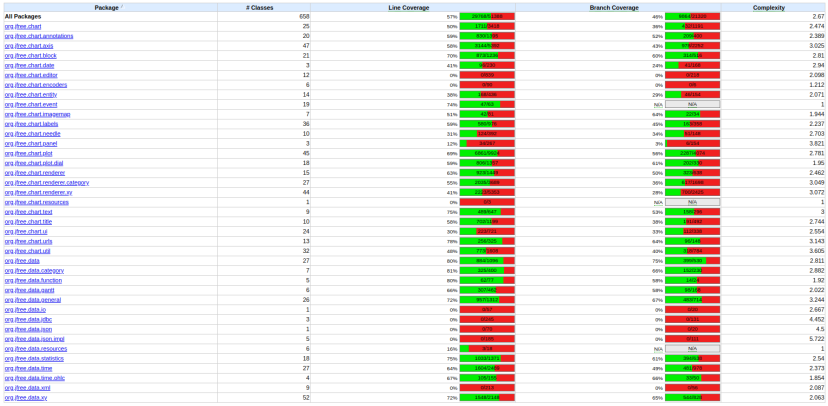
Figure 4: Codescene Hotspots

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.



Package	# Classes	Line Coverage	Branch Coverage	Complexity
All Packages	658	57%	46%	2.67
org.jfree.chart	25	50%	38%	2.474
org.jfree.chart.annotations	20	59%	52%	2.389
org.jfree.chart.axis	47	58%	43%	3.025
org.jfree.chart.block	21	70%	60%	2.81
org.jfree.chart.date	3	41%	24%	2.94
org.jfree.chart.editor	12	0%	0%	2.098
org.jfree.chart.encoders	6	0%	0%	1.212
org.jfree.chart.entity	14	36%	29%	2.071
org.jfree.chart.event	19	74%	N/A	1
org.jfree.chart.imagemap	7	91%	84%	1.944
org.jfree.chart.labels	36	59%	45%	2.237
org.jfree.chart.needle	10	31%	34%	2.703
org.jfree.chart.panel	3	12%	3%	3.821
org.jfree.chart.plot	45	69%	58%	2.781
org.jfree.chart.plot.dial	18	59%	41%	1.95
org.jfree.chart.renderer	15	63%	50%	2.462
org.jfree.chart.renderer.category	27	55%	36%	3.049
org.jfree.chart.renderer.xy	44	41%	28%	3.072
org.jfree.chart.resources	1	0%	N/A	1
org.jfree.chart.text	9	75%	53%	3
org.jfree.chart.title	10	56%	38%	2.744
org.jfree.chart.ui	24	30%	33%	2.554
org.jfree.chart.urls	13	78%	64%	3.143
org.jfree.chart.util	32	48%	49%	3.605
org.jfree.data	27	80%	75%	2.811
org.jfree.data.category	7	81%	66%	2.882
org.jfree.data.function	5	80%	58%	1.92
org.jfree.data.gantt	6	66%	58%	2.022
org.jfree.data.general	26	72%	67%	3.244
org.jfree.data.io	1	0%	0%	2.667
org.jfree.data.jdbc	3	0%	0%	4.452
org.jfree.data.json	1	0%	0%	4.5
org.jfree.data.json.impl	5	0%	0%	5.722
org.jfree.data.resources	6	16%	N/A	1
org.jfree.data.statistics	18	75%	61%	2.54
org.jfree.data.time	27	64%	49%	2.373
org.jfree.data.time.ohlc	4	67%	66%	1.654
org.jfree.data.xml	9	0%	0%	2.087
org.jfree.data.xy	52	72%	65%	2.063

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)