Methodology for Assessing the State of the Practice for Domain X

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—— **Abstract** ————————————————————————————

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Contents

1   Introduction

Purpose and scope of the document. [Needs to be filled in. Should reference the overall research proposal, and the "state of the practice" exercise in particular. —SS]

2   Overview of Steps in Assessing Quality of the Domain Software

1. Identify domain. (Provide criteria on a candidate domain.)
2.

3   Identify Candidate Software

4   Domain Analysis

Commonality analysis. Follow as for mesh generator (likely with less detail).

5 Empirical Measures

5.1 Raw Data

Measures that can be extracted from on-line repos.

[Still at brainstorm stage. —AD]

- number of contributors
- number of watches
- number of stars
- number of forks
- number of clones
- number of commits
- number of total/code/document files
- lines of total/logical/comment code
- lines/pages of documents (can pdf be extracted?)
- number of total/open/closed/merged pull requests
- number of total/open/closed issues
- number of total/open/closed issues with assignees

5.2 Processed Data

Metrics that can be calculated from the raw data.

[Still at brainstorm stage. —AD]

- percentage of total/open/closed issues with assignees - Visibility/Transparency
- lines of new code produced per person-day - Productivity
- lines/pages of new documents produced per person-day - Productivity
- number of issues closed per person-day - Productivity
- percentage of comment lines in the code - maintainability [Not Ao's qualities —AD]

5.3 Tool Tests

[This section is currently a note of unorganized contents. Most parts will beremoved or relocated. —AD]

[This citation needs to be deleted later. It's here because my compiler doesn't work with 0 citations —AD] Emms [2019]

Most tests were done targeting to the repo of 3D Slicer GitHub repo

5.3.1 git-stats

GitHub repo

Test results: http://git-stats-slicer.ao9.io/ the results are output as webpages, so I hosted for you to check. Data can be downloaded as spreadsheets.

5.3.2 git-of-theseus

GitHub repo

Test results: It took about 100 minutes for one repo on a 8 core 16G ram Linux machine. It only outputs graphs.

5.3.3   hercules

GitHub repo

Test results: this one seems to be promising, but the installation is complicated with various errors.

5.3.4   git-repo-analysis

GitHub repo

5.3.5   HubListener

GitHub repo

The data that HubListener can extract.
Raw:
- Number of Files
- Number of Lines
- Number of Logical Lines
- Number of Comments

Cyclomatic: Intro
- Cyclomatic Complexity

Halstead: Intro
- Halstead Effort
- Halstead Bugs
- Halstead Length
- Halstead Difficulty
- Halstead Time
- Halstead Vocabulary
- Halstead Volume

Test results: HubListener works well on the repo of itself, but it did not work well on some other repos.

5.3.6   gitinspector

GitHub repo

Test results: it doesn't work well. Instead of creating output results, it prints the results directly in the console.

6   User Experiments

Describe experiments with users to assess usability, performance etc.

7   Analytic Hierarchy Process

Describe process. Domain expert review.

8   Quality Specific Measures

8.1   Installability [owner —OO]

8.2   Correctness [owner —OO]

8.3   Verifiability/Testability [owner —OO]

8.4   Validatability [owner —OO]

8.5   Reliability [owner —OO]

8.6   Robustness [owner —PM]

8.7   Performance [owner —PM]

8.8   Usability [owner —JC]

8.9   Maintainability [owner —PM]

8.10   Reusability [owner —PM]

8.11   Portability [owner —PM]

8.12   Understandability [owner —JC]

8.13   Interoperability [owner —AD]

8.14   Visibility/Transparency [owner —AD]

8.15   Reproducibility [owner —SS]

8.16   Productivity [owner —AD]

8.17   Sustainability [owner —SS]

8.18   Completeness [owner —AD]

8.19   Consistency [owner —AD]

8.20   Modifiability [owner —JC]

8.21   Traceability [owner —JC]

8.22   Unambiguity [owner —SS]

8.23   Verifiability [owner —SS]

8.24   Abstract [owner —SS]

9   Using Data to Rank Family Members

Describe AHP process (or similar).

References

Steve Emms. 16 best free linux medical imaging software. https://www.linuxlinks.com/medicalimaging/, 2019. [Online; accessed 02-February-2020].