Methodology for Assessing the State of the Practice for Domain X

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Abstract

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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

1. Must be open source.
2. Must have GitHub repository.

4 Domain Analysis

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

Commonality analysis document Steps:

1. Introduction
2. Overview of Domain

3. Add Commonalities - Split into simulation, input, output, and nonfunctional requirements
4. Add Variabilites - Split into simulation, input, output, system constraints, and nonfunctional requirements
5. Add Parameters of Variation - Split into simulation, input, output, system constraints, and nonfunctional requirements
6. Add Terminology, Definitions, Acronyms

Commonality analysis for Lattice Boltzmann Solvers can be found here.

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]
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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].