Socio-Architectural Analysis in Kaiaulu

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https://github.com/sailuh/kaiaulu

What is Kaiaulu?

Kaiaulu is an R package that helps with understanding evolving software development communities, and the artifacts (gitlog, mailing list, files, etc.) which developers collaborate and communicate with.

Problem

- Create reproducible mining software repositories pipeline
- Expose assumptions to mitigate threats to validity in experimental design
- Minimal path to data

Objectives

- Improve Kaiaulu usability via cheatsheets
- Better represent project communication network in mailing lists with inclusion of issue trackers like Bugzilla
- Define an API for DV8 to enable reproducible pipelines, notebooks, and visualizations

Methodology

- Project Management
  - Agile process
  - Github issues/pull requests/project board
- Roles
  - Malia - Technical/Documentation
  - Nico - Technical/Testing
  - Leilani - Technical/Communications/Meeting Scribe/ Requirements

Technologies Utilized

- **R Packages**
  - ***jsonlite, data.table, httr***
    - Retrieve, load, and read project data
  - ***testthat***
    - Unit testing
- **Third Party Tools**
  - ***Perceval***
    - Retrieve project data from Bugzilla sites
  - ***DV8***
    - Convert project data to design structure matrices

Tasks Accomplished

❑ **Documentation/Unit Testing**

- Improvements to the Kaiaulu documentation (social smells notebook, function documentation, and wiki)
- Created Kaiaulu cheatsheet
- Added unit tests (integrated into GitHub actions) to various Kaiaulu modules

❑ **Bugzilla Wrapper/Crawler**

- Bugzilla Wrapper (Perceval traditional & REST API backends)
  - Created downloader functions to call Perceval commands
  - Created parser functions to parse Bugzilla data
- Bugzilla Crawler (REST API)
  - Created downloader functions to extract Bugzilla data directly from the REST API
  - Created parser functions to parse Bugzilla issues and comments data

❑ **DV8 Integration**

- Created wrapper functions to call DV8 commands
- Created parser functions and new data representations not available in DV8 for new analysis
- Defined functionality to export any type of Kaiaulu graph to JSON for interoperability with tools like DV8

Challenges

- Getting familiar with the project's functions and documentation
- All team members relatively unfamiliar with the R language
- Moving away from Windows to Linux/OSX

Learnings

- Becoming adaptable between different OS
- How to be productive with the RStudio IDE
- Professional version control management with Git
- Software design analysis and flaws

Conclusion

Performing project analysis on repositories and issue trackers like Bugzilla can aid in tracking project dynamics, while analysis through DV8 can reveal architectural flaws and potential code relation problems. By analyzing data and identifying patterns, project managers can make informed decisions, mitigate risks, and ultimately improve project performance. Therefore, these newly integrated analysis capabilities are a valuable addition to Kaiaulu.