OPTIMIZING CHANGE RECOMMENDATIONS

This briefing reports scientific evidence on the use of a Genetic Algorithm to optimizes the software change recommendations.

FINDINGS

- In this work we proposed a fitness function for a Genetic Algorithm that optimizes the set of recommended changes by association rules.

- We compared our approach to a prediction mechanism based on linear regression (Moonen et al. 2016) and evaluated the results on five open source projects, namely: CPython, Django, Laravel, Shiny and Gson.

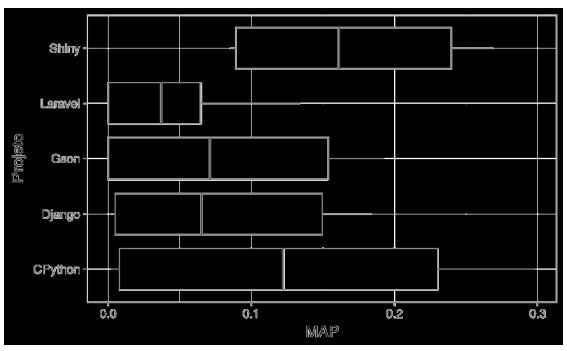

Figure 1: Regression Model distribution for each project

- Figure 1 contains the Mean Average Precision (MAP) values obtained by the regression model using different cut-off values for support and confidence in each studied project. The boxplots show that choosing non-optimal solutions can lead to wrong recommendations.

- Our results indicate that the genetic algorithm model is able to find optimized cut-off values for support and confidence, as well as to determine which length of commit history yields the best recommendations.

- The Genetic Algorithm model adapts to the size of project commit history.

- For projects with less commit history (less than 5k commits), the Genetic Algorithm model achieved better results than the linear regression model. This result is particularly encouraging, because repositories such as GitHub host many young projects with few commits.

- Improving the accuracy of change recommendations (MAP) reduces the developer's effort to propagate changes in software systems.

- Applying new changes to the software system deteriorates the stability of the change recommendation model.

- The results can be used by researchers when conducting change prediction studies. Tool developers can also leverage our approach to build tailored change recommendation tools that do not require manually presetting cut-off values for support and confidence.

Keywords

Change Recommendation
Association Rules
Genetic Algorithm

Who is this briefing for?

Software engineering practitioners who want to make decisions about the use of software change recommendations in practice based on scientific evidence.

Where the findings come from?

All findings of this briefing were obtained from the empirical study conducted by Wessel et al.

What is included in this briefing?

The main findings about the use of Genetic Algorithm model to optimize software change recommendations.

To access other evidence briefings on software engineering:

http://www.lia.ufc.br/~cbsoft2017

ORIGINAL RESEARCH REFERENCE

WESSEL, Mairieli Santos et al. ***Tweaking Association Rules to Optimize Software Change Recommendations***. 31st Brazilian Symposium on Software Engineering, 2017.