



LUND UNIVERSITY

The More the Merrier: Leveraging on the Bug Inflow to Guide Software Maintenance

Borg, Markus; Jonsson, Leif

Published in:
Tiny Transactions on Computer Science

2015

[Link to publication](#)

Citation for published version (APA):
Borg, M., & Jonsson, L. (2015). The More the Merrier: Leveraging on the Bug Inflow to Guide Software Maintenance. *Tiny Transactions on Computer Science*, 3.

Total number of authors:
2

General rights

Unless other specific re-use rights are stated the following general rights apply:
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

Read more about Creative commons licenses: <https://creativecommons.org/licenses/>

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

LUND UNIVERSITY

PO Box 117
221 00 Lund
+46 46-222 00 00

The More the Merrier: Leveraging on the Bug Inflow to Guide Software Maintenance

Markus Borg
Dept. of Computer Science
Lund University
Lund, Sweden
markus.borg@cs.lth.se

Leif Jonsson
Ericsson AB
Stockholm, Sweden
leif.jonsson@ericsson.com

ABSTRACT

Issue management, a central part of software maintenance, requires much effort for complex software systems. The continuous inflow of issue reports makes it hard for developers to stay on top of the situation, and the threatening information overload makes activities such as duplicate management, Issue Assignment (IA), and Change Impact Analysis (CIA) tedious and error-prone. Still, most practitioners work with tools that act as little more than issue containers.

Machine Learning encompasses approaches that identify patterns or make predictions based on empirical data. While humans have limited ability to work with big data, ML instead tends to improve the more training data that is available. Consequently, we argue that the challenge of information overload in issue management appears to be particularly suitable for ML-based tool support. While others have initially explored the area, we develop two ML-based tools, and evaluate them in proprietary software engineering contexts.

We replicated [1] for five projects in two companies, and our *automated IA obtains an accuracy matching the current manual processes*. Thus, as our solution delivers instantaneous IA, an organization can potentially save considerable analysis effort. Moreover, for the most comprehensive of the five projects, we implemented automated CIA in the tool ImpRec [3]. We evaluated the tool in a longitudinal *in situ* study, i.e., deployment in two development teams in industry. Based on log analysis and complementary interviews using the QUPER model [2] for utility assessment, we conclude that *ImpRec offered helpful support in the CIA task*.

BODY

Humans obscured by bug overload, but machine learning benefits from plentiful training data. Practitioners confirm value of developed tools.

REFERENCES

- [1] L. Jonsson, D. Broman, K. Sandahl, and S. Eldh. Towards Automated Anomaly Report Assignment in Large Complex Systems Using Stacked Generalization, In *Proc. of the 5th International Conference on Software Testing, Verification and Validation*, pp. 437-446, 2012.
- [2] B. Regnell, R. Berntsson Svensson, and T. Olsson. Supporting Roadmapping of Quality Requirements, *IEEE Software*, 25(2), pp. 42-47, 2008.
- [3] M. Borg, and P. Runeson. Changes, Evolution, and Bugs - Recommendation Systems for Issue Management, In M. Robillard, W. Maalej, R. Walker, and T. Zimmermann (Eds.) *Recommendation Systems in Software Engineering*, pp. 477-509, Springer, 2014.

Volume 3 of Tiny Transactions on Computer Science

This content is released under the Creative Commons Attribution-NonCommercial ShareAlike License. Permission to make digital or hard copies of all or part of this work is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page.
CC BY-NC-SA 3.0: <http://creativecommons.org/licenses/by-nc-sa/3.0/>.