

Editorial Preface

Special Issue on Advancements in Open Source Software Engineering

Varun Gupta, National Institute of Technology, Department of Computer Science and Engineering, Hamirpur, India

Thomas Hanne, University of Applied Sciences and Arts Northwestern Switzerland, Institute for Information Systems, Olten, Switzerland

Rolf Dornberger, University of Applied Sciences and Arts Northwestern Switzerland, Institute for Information Systems, Olten, Switzerland

Chetna Gupta, Jaypee Institute of Information Technology, Department of Computer Science and Information Technology, Noida, India

Aspects of software quality provide particular challenges in the field of open source software development. One of the main reasons is that there is frequently not a strong organization and a respective budget behind such projects. The collaborative development of software from multiple independent sources makes the process more difficult, time consuming, and the outcomes may be more questionable concerning their quality. Often such projects benefit from a strong enthusiasm of the developers and may lead to innovative solutions. However, often the later life cycle of the software including testing, bug fixing, and other maintenance activities, may experience a decline of this enthusiasm.

This is one of the reasons why a specific focus on novel approaches related to software quality especially for open source projects is obvious. Besides that, it can be said that such quality aspects certainly matter for proprietary software as well due to high costs, which may result from quality issues.

INSIDE THIS ISSUE

In this Special Issue of the International Journal of Open Source Software and Processes (IJOSSP) there are three papers which deal with various aspects of software development. In all papers aspects related to software quality and reliability are considered.

In the article “From Android Bug Reports to Android Bug Handling Process: An Empirical Study of Open-Source Development” the Google’s open source operating system for mobile devices and the development of respective software is considered. The article focusses on the online bug tracking system that can easily be used by anyone. The authors analyze the bug reports of Android operating systems and investigate the effectiveness of the process in terms of bug report handling times, the distribution of subsequent maintenance activities and subsequent communications related to an Android bug report. The information obtained from this empirical study could help to better understand and improve open-source software development projects.

Next, the article “A Novel Method for Test Path Prioritization using Centrality Measures” deals with aspects of software testing. In the paper, a concept for creating suitable test data is developed based on the idea to test it against the Program Under Test (PUT) considering various criteria. Starting with arbitrarily set test information the test process is guided towards test path prioritization, which uses the concept of centrality measures. The suggested algorithm determines the importance of each node in the test paths by using various centrality indicators. Based on these measures an efficient test path is determined which allows for a sufficiently comprehensive testing with a smaller number of prioritized paths. The novel approach is demonstrated in some tests.

Finally, in the article “Software Reliability Prediction Using Cuckoo Search Optimization, Empirical Mode Decomposition and ARIMA Model” various advanced methods are used for problems in software engineering. The main problem considered is the reliability and quality of software, which is especially relevant for open source software since the development situation is heterogeneous and not well financed whereas it is intended to use the software in a widespread number of applications. The reliability of respective software can be estimated by parametric and nonparametric models, which frequently have significant limitations in their accuracy. Among these models, non-parametric ones are often considered as more promising but exhibit higher computation costs. In the study, a rather novel and powerful optimization method from the field of metaheuristics is employed to tune the respective reliability model. This method called Cuckoo Search is adapted to the specific model under consideration based on ensemble empirical mode decomposition and ARIMA modeling of time series. Extensive experiments on five real datasets (based on open source and propriety software development) are conducted and the obtained results indicate the superiority of the proposed technique over some existing parametric and non-parametric models.

CONCLUSION

The included papers demonstrate that novel approaches can alleviate the dilemma between software quality and development effort, which is especially significant in open-source software projects. The better usage of empirical knowledge (e.g. from bug report analysis) as well as intelligent approaches from statistics, computational intelligence or related to graph-based approaches can improve software development in general, but in particular, related to quality assurance, testing, and defect handling.

It can be assumed that much more research going into these directions is required in the future but also the dissemination into software development practice provides at least equally significant challenges.

Varun Gupta
Thomas Hanne
Rolf Dornberger
Chetna Gupta
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