ISSN:0975-9646

Prediction with V&V and Fault-Tolerance Strategies for Mandelbugs

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Abstract: **The information about which modules in a software system's future version are potentially Mandelbugs is a valuable aid for quality managers and testers. Mandelbugs prediction promises to indicate these Mandelbugs -vulnerable modules. Constructing effective defect prediction models in an industrial setting involves the decision from what data source the Mandelbugs predictors should be derived. In this paper we compare Mandelbugs prediction consequences based on three different data sources of a large industrial software system to answer the question what repositories to mine. In addition, we investigate whether a combination of different data sources improves the prediction consequences. The findings indicate that predictors derived from static code and design analysis provide slightly yet still significant better outcome than predictors derived from version control, while a combination of all data sources showed no further improvement. we aim to combine prediction with V&V and fault-tolerance strategies**.

Keywords: **Mandelbugs, predictors, bug features, fault-tolerance strategies.**

I. INTRODUCTION

Mandelbug: a bug whose activation and/or error propagation are "complex", where complexity can be caused by the possibility of a time lag between the fault activation and the failure occurrence, or the interactions of the software application with its system-internal environment (hardware, operating system, or other applications), the timing of inputs and operations (relative to each other), and the sequencing of inputs and operations. Knowing which modules are likely to contain Mandelbugs in advance can assist in directing software quality assurance measures such as inspection and testing to these potentially critical modules. With d Mandelbugs prediction, the defect- prone modules in an upcoming version of a software system can be predicate from data about previous versions. Thus, Mandelbugs prediction is a promising aid to increase the effectiveness and efficiency of these usually costly quality assurance measures [1]. The feasibility of predicting Mandelbugs modules has been subject to numerous empirical studies. These studies exploit different sets of metrics as Mandelbugs predictors, i.e. independent variables that are presume to indicate the defectiveness of software modules. Static product metrics are one category of metrics that have been frequently used as Mandelbugs predictors. Examples are metrics related to size, complexity, object-oriented design, and system structure. Another category includes process metrics characterizing various aspects and activities of software development. Examples are metrics related to change history, code churn, or defect resolutions. Finally, resource metrics like metrics about development personnel have recently been involved in empirical studies. Such metrics have been derived from social networks of developers or their contributions to the software system. Collecting and preprocessing historical data and deriving metrics suitable for constructing prediction models can cause considerable effort. It represents one of the major cost factors in establishing Mandelbugs prediction in perform. The data has to be retrieved by mining software repositories. Repositories and corporate databases such as versioning systems, issue tracking systems, build systems, or project documentation. As the data in these repositories and databases has been collected for a specific purpose other than defect prediction, the structure and quality of the data is often inappropriate to derive meaningful metrics. Thus, the relevant data has to be extracted, restructured, cleaned, interpreted and validated before it can be used for defect prediction. Further effort is required to integrate data from heterogeneous repositories and databases with different semantics and levels of granularity, timeliness, quality and completeness. The required effort for mining and data preparation limits the number of repositories and databases that can be included when constructing Mandelbug prediction models in a real-world setting. Thus, defect prediction is often based on metrics derived from a single data source, capturing only a small fraction of the available project history spread over different repositories and databases. However, little is known about what data sources and related metrics are preferable for Mandelbug prediction as only few of the available empirical studies focus on more than one category of metrics.

II. RELATED WORK

In the previous decades software bugs in huge and complex system have broadly been studied for a number of purposes. the majority of the studies were aimed at understanding and differentiate bugs in terms of their location in the code and their features, Gabriella Carrozza in at al[1] they have investigated how to predict the location of Mandelbugs in complex software systems. They have found that Mandelbugs account for a noticeable share of bugs, and that there are components more prone to Mandelbugs than others. This fact motivates the use of fault prediction to focus V&V activities and fault-tolerance mechanisms found that using both traditional software metrics and a novel set of metrics (based on concurrency, I/O and exception handling constructs), fault prediction can achieve high accuracy.

K. S. Trivedi in at al [2] presents a closed-form expression of the mean time to recovery from these bugs. Measures of interest including mean time to recovery and system unavailability are computed. A numerical and parametric sensitivity analysis of the model parameters are carried out. This analysis allows the designer to find out important parameter(s) for the recovery from failures due to Mandelbugs.

M. Grottke in at al [3] analyzes the faults discovered in the on-board software for 18 JPL/NASA space missions. They have presented the proportions of the various fault types and study how they have evolved over time. Moreover, examine whether or not the fault type and attributes such as the failure effect are independent.

Kevin S. Killourhy in at al [4] they have proposed collect a data set, develop an evaluation procedure, and measure the performance of many anomalydetection algorithms on an equal basis. In the process they have established which detectors have the lowest error rates on our data (e.g., the Nearest Neighbor (Mahalanobis) detector), and provide a data set and evaluation methodology that can be used by the community to assess new detectors and report comparative results.

Pedro Fonseca in at al [5] they have able to find a considerable number of concurrency bugs in a stable version of the database. Furthermore, the effort to provide the required annotations was small, and after installing simple filters we also found the number of false positives to be modest. All of this was achieved without having to outline out which were the correct outputs (or final states) for any given inputs.

III. Proposed Methodology

With software systems becoming increasingly large and complex, many difficulties in coping with software bugs arise for developers. Despite good development practices, thorough testing, and proper maintenance policies, a non-negligible number of bugs remain in the released software. Understanding the type of residual bugs is fundamental for adopting proper countermeasures in current and future software releases. Depending on the fault triggering conditions that lead to a failure, developers can introduce fault-tolerance mechanisms and plan verification and validation strategies. Prediction with v&v and fault-tolerance strategies for mandelbugs through our propose work Deeper understanding of bugs from this perspective will be a driving factor in implementing policies for cost-effective software development. Our work will therefore be devoted to relating these bug features to the software development process. The objective of this research to compare consequences from predictions bas on different data sources and, furthermore, their combination. Therefore the research contributes a comparative analysis conduct as a research with consecutive versions of a large industrial software system. The apply prediction metrics derive from software repositories and databases for static code and design analysis, version control, and releases management. From a practical point of view, the evaluation of the prediction outcome addresses the following questions: What repositories and databases should be mined for prediction metrics? Will the combination of metrics derived from different data sources achieve “better” prediction results?

In this research we compare prediction base on three different data sources of a large industrial software system to address the questions: “What repositories should be mined for prediction metrics?” and “Will the combination of metrics from different data sources improve prediction results?”. The prediction models were constructed with metric sets derived from each of the three data sources (static analysis, version control, and release management) as well as from their combination. Many consecutive versions of the software system were used to train the prediction models and to validate. Our findings indicate that data from static analysis leads to slightly yet still significant better prediction than models based on version control data. Prediction models constructed from any of these two data sources produce outcome clearly superior to those based on data from release management, which produce several consequences even below chance level. No further improvements could be yield from models based on the combination of the three data sources when compare achieve with static analysis data. We combine inform of the union of the metric sets derive from the different sources. More sophisticate ways for constructing combinations than this relatively simple approach of using a union have been proposed in the field of statistical learning. For example, the output from separate prediction models trained on each single data source can also be aggregate by bagging, stacking or boosting. An investigation of these approaches in order to build more accurate prediction models and to produce improved consequences is the subsequently step of our planned the prediction of Mandelbugs seems to converge to a constant value during the lifecycle, although past studies hypothesized that the percentage of Mandelbugs should be predominant in the long term. To ineffective quality assurance and testing activities, and by the possibility of introducing new bugs during the project lifecycle. Analysis of subtypes indicates that timing-related faults are the largest part of Mandelbugs, although other Mandelbugs, such as those involving interactions with other software and hardware, account for a remarkable share. Similarly, memory-related aging-relate bugs predominate, although leaks related to system-dependent data structures are also frequent. Our propose work fix a bug significantly affect by the bug the relationships between fault type and further characteristics, like failure effect, and failure risk type, and strategies specifically tailored for Mandelbugs would certainly help differences in the fault type proportions across missions and the development of the fault type proportions within a mission, as the mission duration increases. The development process for recent missions has changed so that a higher proportion of the faults created are Bohrbugs Alternatively, for more recent missions, fault detection and removal techniques have become more effective at reducing the number of Mandelbugs remaining in the system at launch time. Mandelbugs take longer to fix, and require specific strategies to be dealt with. We found a statistically important Dissimilarity in the times to fix of Bohrbugs and Mandelbugs, in that order. In each of these cases, Mandelbugs be inclined to have a better time to fix than Bohrbugs. Adopt preparation and tools for improving the analysis of Mandelbugs would get better the fixing time of bugs. Furthermore, Mandelbugs are by their nature complicated to detect by testing, and they need additional exact technique to be establish through V&V. If the number of Mandelbugs establish throughout process is high, there are essentially two alternative. The first one is to employ additional V&V method for future releases, by bring in replica checking, stress testing, code reviews. The subsequent solution is to rely on runtime failure detection and recuperation mechanisms [7], to recompense for the longer repair time of these bugs, and allow alone system downtime while developers look into the root reason of problems. Recovery method takes in: restart of a component or a service; reconfiguration of mechanism (relocation to a miscellaneous surroundings) retry operation. These approach can be adopt depending on the method and failure type (a retry can be successful in the crate of a timing bug in the software function, while a absolute reboot is desirable intended for bugs in the OS. furthermore, software aging subject can be disallowed by software rejuvenation [16], a method that proactively restart a system in arrange to evade the event of age failures.

IV. Conclusion

Through our propose work Deeper understanding of bugs from this perspective will be a driving factor in implementing policies for cost-effective software development. Our work therefore be devoted to relating these bug features to thesoftware development process. The development process for recent missions has changed so that a higher proportion of the faults created are Bohrbugs Alternatively, for more recent missions, fault detection and removal techniques have become more effective at reducing the number of Mandelbugs remaining in the system at launch time.

Reference

[1] Gabriella Carrozza_, Domenico Cotroneoy, Roberto Natellay, Roberto Pietrantuonoy, Stefano Russo," Analysis and Prediction of Mandelbugs in an Industrial Software System" doi.ieeecomputersociety.org/10.1109/ICST.2013.21.

[2] K. S. Trivedi, R. Mansharamani, D. S. Kim, M. Grottke, and M. Nambiar, "Recovery from failures due to Mandelbugs in IT systems," in Proc. Pacific Rim Intl. Symp. Depend. Comp., 2011, pp. 224–233.

[3] M. Grottke, A. Nikora, and K. Trivedi, "An empirical investigation of fault types in space mission system software," in Proc. Intl. Conf. Dep. Sys. and Netwks., 2010, pp. 447–456.

[4] K. Killourhy and R. Maxion, "Comparing anomaly-detection algorithms for keystroke dynamics," in Proc. Intl. Conf. Dep. Sys. and Netwks., 2009, pp. 125–134.

[5] Pedro Fonseca, Cheng Li, and Rodrigo Rodrigues," Finding Complex Concurrency Bugs in Large Multi-Threaded Applications" EuroSys'11, April 10–13, 2011, Salzburg, Austria.

[6] M. Grottke, A. P. Nikora, and K. S. Trivedi, "An empirical investigationof fault types in space mission system software," in Proc. Intl. Conf.Depend. Sys. and Netwks., 2010, pp. 447–456.

[7] M. Grottke, R. Matias, and K. Trivedi, "The fundamentals of software aging," in Proc. Wksp. Softw. Aging Rejuv., 2008.

[8] Wikipedia, "LAMP (software bundle)," http://en.wikipedia.org/wiki/LAMP(software bundle), 2013.