

Evaluating the Effectiveness of Object Oriented Metrics for Bug Prediction

István Siket

Although a lot of object-oriented metrics were defined and published in the last decades their usage is still not widespread. The main reason of this is that the relationship between object-oriented metrics and software qualities (e.g. maintainability or reusability) were rarely confirmed with experimental results [1].

In our experiment we examined the relationship between object-oriented metrics and fault proneness of classes. We analyzed a large open source software called Mozilla, calculated 58 object-oriented metrics for the classes of Mozilla [2], collected the reported and corrected bugs from the bug tracking system of Mozilla and associated them with its classes. We applied logistic regression to examine which metrics could be used to predict the faultiness of the classes. We found that 17 of the 58 object-oriented metrics were useful predictors but in different rate. CBO (Coupling Between Object classes) metric was the best but it was only a slightly better than NOI (Number of Outgoing Invocations) and RFC (Response Set for a Class) which were proven useful as well.

We also examined the metrics by their categories and we obtained that coupling metrics were the best predictors for finding bugs but the complexity and size metrics also gave good results. On the other hand, all inheritance metrics were statistically insignificant.

We tried to achieve better result by using more predictors (multivariate logistic regression) but the result was almost the same as the result of CBO, which was the best metric.

Keywords: compiler wrapping, object-oriented metrics, logistic regression, fault prediction

References

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