Abstract

In software development research, early prediction of defective software modules always attracts the developers because it can reduce the overall requirements of software development such as time and budgets and increases the customer satisfaction. In the current context, with constantly increasing constraints like requirement ambiguity and complex development process, developing fault-free reliable software is a daunting task. To deliver reliable software, it is essential to execute exhaustive number of test cases which may become tedious and costly for software enterprises. To ameliorate the testing process, a defect prediction model can be used which enables the developers to distribute their quality assurance activity on defect prone modules. However, a defect prediction model requires empirical validation to ensure their relevance to a software enterprises. In recent past, several classification and prediction models, based on historical defect data sets, have been used for early prediction of error-prone modules. Considering these facts, in this paper, a new Support Vector based Fuzzy Classification System (SVFCS) has been proposed for defective module prediction. In the proposed model an initial rule set is constructed using support vectors and Fuzzy logic. Rule set optimization is done using Genetic algorithm. The new method has been compared against two other models reported in recent literature viz. Naive Bayes and Support Vector Machine by using several measures, precision and probability of detection and it is found that the prediction performance of SVFCS approach is generally better than other prediction approaches. Our approach achieved 76.5 mean recall and 34.65 mean false alarm rate on
three versions of Eclipse (Eclipse (2.0, 2.1, 3.0) and Equinox software bug data sets which strongly endorse the significance of proposed model in defect prediction research.

References

- Nagappan, N., Ball, T. "Explaining failures using software dependences and churn Metrics"; 2006, Microsoft Research, Redmond, WA.
Defect Prediction for Object Oriented Software using Support Vector based Fuzzy Classification Model

- Promise. http://promisedata.org/repository.
- Pitiranggon, P. , Beenjathepanun, N. , Banditvilai, S. , Boonjing,V. "Fuzzy Rule Generation and Extraction from Support Vector Machine based on Kernel Function Firing Signal". 2010, International journal of Engineering and applied sciences. 6,244-251
- Fawcett, T. , "ROC Graph: Notes and Practical Consideration for Data Mining Researches". 2003 Intelligent Enterprise Technology Laboratory.
- Burges, C. "A tutorial on support vector machines for pattern recognition". 1998 Data mining and knowledge discovery 2,121-167.

Index Terms

Computer Science Fuzzy Systems

Keywords

Software Fault Fault Prediction Fuzzy Rule Base Support Vector Machine Genetic Algorithm
ROC