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Decision tree–based improved software fault prediction: a computational intelligence approach

From the book Computational Intelligence in Software Modeling

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Abstract

Software plays a significant role in our daily lives. The use of smart real-time devices has increased dramatically in the recent decade, necessitating the creation of fault-tolerant, high-reliability software. The basic goal of dependable and robust software is to reduce the quantity of failures that occur when a program is executed. Software fault prediction is a key activity for increasing quality assurance efficiency, economy, and precision. Fault prediction is critical for identifying software components that are prone to flaws. The majority of previous software fault prediction research has concentrated on categorizing software modules whether they are faulty or not. The most important criterion for developing an effective fault prediction model is to identify a dependable fault prediction technique. Due to some inherent constraints, manual techniques of forecasting and finding defects in complex systems may not guarantee a fault-free system, and they are generally time intensive. Computational intelligence (CI) techniques provide promising approaches for solving such problems. In this chapter, we investigate the applications of CI in optimizing various phases of software development. Further, the application of decision tree regression (DTR) for improving fault percentage prediction in different scenarios is the main contribution of this chapter. Two datasets of different sizes from PROMISE repository are extracted and used for performance analysis of the proposed model. The results reveal that DTR generated significant prediction accuracy in intra-release projects.

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