A New Method to Optimize the Reliability of Software Reliability Growth Models using Modified Genetic Swarm Optimization

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Abstract

Software reliability is one of the key attributes to determine the quality of a software system. Finding and minimizing the remaining faults in software systems is a challenging task. Software reliability growth model (SRGM) with testing-effort function (TEF) is very helpful for software developers and has been widely accepted and applied. However, each SRGM with TEF (SRGMTEF) contains some undetermined parameters. Optimization of these parameters is a necessary task. Generally, these parameters are estimated by the Least Square Estimation (LSE) or the Maximum Likelihood Estimation (MLE). However, the software failure data may not satisfy such a distribution. We investigate the improvement and application of a swarm intelligent optimization algorithm, namely Modified Genetic Swarm Optimization algorithm, to optimize these parameters of SRGMTEF. The performance of the proposed SRGMTEF model with optimized parameters is also compared with other existing models Genetic Algorithm (GA), and Particle Swarm Optimization (PSO). The experiment results show that the proposed parameter optimization approach using Modified Genetic Swarm Optimization is very effective and flexible, and the better software reliability growth performance can be obtained based on
SRGMTEF on the different software failure datasets. Also, provided comparison of ten SRGMs (Like Goel-Okumoto Model, Delayed S-shaped Growth Model, Yamada Imperfect Debugging Models, Yamada Rayleigh Model, Inflection S-shaped Model…..etc).

References


Index Terms

Computer Science

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Keywords

Software Reliability Growth Model, Testing Effort Function, Genetic Algorithm, Particle Swarm Optimization, Modified Genetic Swarm Optimization. Software Reliability