Test Suite Optimization Using an Effective Meta-Heuristic BAT Algorithm

Authors : Anuradha Chug, Sunali Gandhi

Abstract : Regression Testing is a very expensive and time-consuming process carried out to ensure the validity of modified software. Due to the availability of insufficient resources to re-execute all the test cases in time constrained environment, efforts are going on to generate test data automatically without human efforts. Many search based techniques have been proposed to generate efficient, effective as well as optimized test data, so that the overall cost of the software testing can be minimized. The generated test data should be able to uncover all potential lapses that exist in the software or product. Inspired from the natural behavior of bat for searching her food sources, current study employed a meta-heuristic, search-based bat algorithm for optimizing the test data on the basis certain parameters without compromising their effectiveness. Mathematical functions are also applied that can effectively filter out the redundant test data. As many as 50 Java programs are used to check the effectiveness of proposed test data generation and it has been found that 86% saving in testing efforts can be achieved using bat algorithm while covering 100% of the software code for testing. Bat algorithm was found to be more efficient in terms of simplicity and flexibility when the results were compared with another nature inspired algorithms such as Firefly Algorithm (FA), Hill Climbing Algorithm (HC) and Ant Colony Optimization (ACO). The output of this study would be useful to testers as they can achieve 100% path coverage for testing with minimum number of test cases.
Keywords : regression testing, test case selection, test case prioritization, genetic algorithm, bat algorithm

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