TBat: A Novel Strategy for Minimization of T-Way Interaction Test Suite Based on the Particle Swarm Optimization and the Bat Algorithm

INTRODUCTION
Our continuing dependencies on software raise issues of reliability. Lack of testing can lead to disastrous consequences including loss of data, loss of fortunes as well as loss of lives. For these reasons, many combinations of possible input parameters, hardware/software environments, and system conditions need to be checked against for conformance based on the system's specification. Often, this results into combinatorial explosion of test cases. This project develops a novel strategy to minimize the test consideration using the Particle Swarm Optimization and the Bat Algorithm.

OBJECTIVE
• To develop a strategy based on the Particle Swarm Optimization and the Bat Algorithm that is able to minimize and optimize the tests consideration without sacrificing the bug-detection capability
• To evaluate the effectiveness of the strategy

PATENT/COPYRIGHTS
The project holds two Malaysian Copyrights:
• A Hamming Particle Swarm Optimization based t-way Test Data Generation Strategy. Copyright obtained: Oct 13, 2015
• BTS: A Constraints Variable Strength t-way Test Suite Generation based on the Bat Algorithm. Copyright obtained: Oct 13, 2015

RESULT/CASE STUDIES
• Testing of Flex v.2.4.7 from Software Infrastructure Repository (http://sir.unl.edu) with 8291 commented LOCs, containing 18 seeded faults can be manually turned on or off with CA (N; t, 24; 31; 161; 61).

NOVELTY
• TBat is the first Bat and PSO based t-way strategy for t-way testing
• TBat integrates all forms of integration possibilities, hence, giving engineers flexibility to choose the sampling method
• TBat outperforms many existing benchmarked experiments for t-way testing
• TBat implementation supports many operating system and platform

BENEFITS
• TBat minimizes the tests required for assessing product conformance. In turn, TBat also minimizes the test costs.
• TBat can help prioritize tests that have more impact on the product under test.

PUBLICATIONS
• Research Book: Combinatorial t-way Testing, UMP Publisher, 2015

COMPETITORS

MARKETABILITY
• Received RM 80K Riyal @ USD 20K as on using TBAT for “Testing wireless sensor network” from Saudi Arabia

ACHIEVEMENTS
• MOSTI - eScienceFund Grants “Development of Constraint T-Way Testing Strategy with MCDC”, RM 123,000 @ USD 40K.
• Gold Medal @ 14th International Conference and Exposition on Inventions by Institutions of Higher Learning 2015
• Gold Medal @ National University Carnival on Elearning 2015

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