

Employing Dynamic Symbolic Execution for Equivalent Mutant Detection

Abstract

Equivalent mutants (EM) issue is a key challenge in mutation testing. Many methods were applied for detecting and reducing the equivalent mutants. These methods are classified into four classes: equivalent mutant detection, avoiding the generation of equivalent mutants, higher-order equivalent mutants, and suggesting equivalent mutants. Higher-order mutation testing (HOMT) is considered the strongest employed technique in avoiding the generation of equivalent mutants and reduction of their number. In this paper, a combination of HOMT especially second-order mutation testing (SOMT) and dynamic symbolic execution (DSE) techniques are applied for the automatic detection and reduction of the equivalent second-order mutants. First, SOMT is used to reduce the number of equivalent mutants. Second, DSE technique is applied to classify the SOMs and detect EM. To assess the efficiency of the proposed