

Constraint-based Fitness function for evolutionary testing

Abdelilah Sakti, Yann-Gaël Guéhéneuc, and Gilles Pesant

Department of Computer and Software Engineering
École Polytechnique de Montréal, Québec, Canada
{abdelilah.sakti,yann-gael.gueheneuc,gilles.pesant}@polymtl.ca

Abstract. Evolutionary testing approach is a powerful automated technique for generating test inputs. Its goal is to reach a branch or a statement in a program under test. One major limit of this approach is its fitness function that does not offer enough information to orient the search to reach a test target with the existence of nested predicates. To address the problem, we propose a new fitness function based on constraint programming. The level of difficulty to satisfy a constraint is the main factor for ranking test candidates: We modulate predicates as a constraint satisfaction problem, then the difficulty-level of a constraint is determined according to the its impact on the search space. Difficulty-level is a novel fitness function have been designed to deal with nested predicates and its usefulness have been improved based on benchmarks from the literature.

Keywords: Evolutionary testing approach, fitness function, difficulty-level of a constraint.