

A univariate marginal approach for pairwise testing of software product lines

ABSTRACT

Software Product Line (SPL) is a software engineering paradigm that is inspired by the concept of reusability of common features, formulated for different software products. Complete testing of all software products in SPL is known to be unfeasible. This is due to the very large number of possible products that can be produced or configured using a combination of features in the SPL. Pairwise Testing is a type of Combinatorial Testing, influenced by the perception that two factors (or features in the context of SPL testing) stimulate most faults. The effectiveness of SPL testing can be measured using the pairwise coverage of test configuration. However, to generate minimal test configuration that maximizes the pairwise coverage is not trivial, especially when dealing with a huge number of features and when constraints have to be satisfied, which is the case in most SPL scenarios. Therefore, it is the motivation of this work to investigate the feasibility of an Estimation of Distribution Algorithm (EDA), specifically the Univariate Marginal Distribution Algorithm (UMDA), in generating minimal test configuration for pairwise testing of SPL. The experimental results show that in certain problem instances, UMDA is able to compete with existing greedy and search-based algorithms.

Keyword: Product line testing; Pairwise testing; Combinatorial testing; Univariate marginal distribution algorithm; Estimation of distribution algorithm