Abstract

Requirement-based test generation is a model-based technique for generating suites of test cases related to individual requirements. Requirement-based test suites can be constructed manually or automatically using a coverage criterion; however, the constructed test suite's size in general is very large and the cost of executing considerably large number of test cases is very expensive. Hence, the problem of test suite reduction arises.

A reduction of requirement-based test suite can be achieved without significantly reducing the fault-detection capabilities of original test suites. This is done by eliminating all but one of the equivalent test cases from each class of equivalent test cases of the original test suite. A requirement-based reduction technique proposed in [**1**] uses EFSM dependency analysis to define classes of equivalent test cases. Two types of dependencies, namely control and data dependencies, are identified in an EFSM/SDL model. Such analysis of these dependencies yields patterns of interaction among the elements of the EFSM/SDL model that affect a requirement under test. The patterns of interaction are in turn used to identify equivalent test cases w.r.t. the requirement under test, i.e., two tests are considered being equivalent w.r.t. the requirement under test if both exhibit the same interaction pattern; hence, one of them can be discarded from the test suite.

In this thesis, based on [**1**], we have proposed algorithms to generate interaction patterns of a test case w.r.t. a requirement under test, algorithms to compare interaction patterns and determine whether or not they are equivalent, and an algorithm to identify a set of interaction patterns (w.r.t. the requirement under test) that are not covered by any test case from a given test suite. Also, *Test Suite Reduction* (TSR) program has been developed based on these algorithms.

[**1**] Boris Vaysburg, Luay H. Tahat, Bogdan Korei, *Dependence Analysis in Reduction of Requirement Based Test Suites*, Proceedings of the International Symposium on Software Testing and Analysis (ISSTA'02, Roma, Italy), pp. 107-111, ACM Press, ISBN: 1-58113-562-9, 2002