

Abstract

During maintenance of evolving software systems, regression testing is a crucial activity in confirming that the unchanged parts of the system have not been adversely affected by the modifications on the system specification and implementation. It is time-and computing-resource-consuming, especially for large software systems. Therefore, regression test suite reduction is important. Most regression testing techniques are code-based. Requirement-based (specification-based) regression testing is a system testing technique used to test software systems modeled by formal description languages, e.g., an Extended Finite State Machine (EFSM). There exists limited research on requirement-based regression testing techniques, and most of these techniques select regression tests using only the modified models of systems. Since the original model is not used to select regression test suites, the quality of regression test suites is questionable.

In this research, we present an extension to an existing requirement-based regression test suite reduction approach that uses EFSM model dependence analysis to reduce a given regression test suite [19]. The approach is based on the difference between the original model and the modified model expressed as a set of elementary model modifications: elementary addition of a transition and elementary deletion of a transition. For each elementary modification, the data and control dependencies are used to capture potential interactions between EFSM transitions. The potential interactions are used to reduce an existing regression test suite by eliminating repetitive tests.

In this thesis, based on [19], we have defined some new dependencies introduced by elementary modifications of the EFSM model. We proposed algorithms to obtain these dependencies; to generate potential interactions with respect to (wrt) an elementary modification; and to reduce the regression test suite. We have also developed a Regression Test Suite Reduction tool, called RTSR based on these algorithms to be used for reducing the size of existing regression test suites. RTSR has been tested and validated.

[19] Korel, B., Tahat, L., and Vaysburg, B., *Model Based Regression Test Reduction Using Dependence Analysis*, Proceedings of the International Conference on Software Maintenance (ICSM.02), pp. 214-223, 2002.