Singularity: A methodology for automatic unit test data generation for C++ applications based on Model Checking counterexamples

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One of the most challenging task of testing activity is the generation of test cases/data. While there is significant amount of studies in this regard, there is still need to move towards approaches that can generate test case/data based only on source code since many software systems mostly have the source code available and no adequate documentation. In this paper a new methodology, called Singularity, is introduced to generate unit test data for C++ applications based on Model Checking, a popular technique for test case generation. Our approach, which is to be supported by a tool, automatically translates C++ code into a model which resembles a Statechart model and then into the notation of the NuSMV Model Checker. Later, we rely on a technique based on the HiMoST Method, producing counterexamples from the Model Checker that are, in fact, the test cases/data themselves. We have applied our approach to a few C++ case studies analyzing how feasible it is for automatic test data generation.