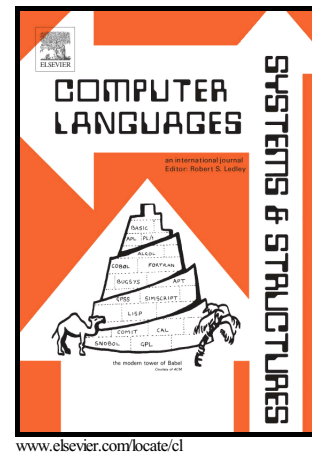


Author's Accepted Manuscript

A Semantic Approach for Automated Test Oracle
Generation

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PII: S1477-8424(15)30021-X
DOI: <http://dx.doi.org/10.1016/j.cl.2016.01.006>
Reference: COMLAN211

To appear in: *Computer Language*

Received date: 10 August 2015
Revised date: 31 January 2016
Accepted date: 31 January 2016

Cite this article as: Hai-Feng Guo, A Semantic Approach for Automated Test Oracle Generation, *Computer Language*
<http://dx.doi.org/10.1016/j.cl.2016.01.006>

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A Semantic Approach for Automated Test Oracle Generation[☆]

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Abstract

This paper presents the design, implementation, and applications of a software testing tool, *TAO*, which allows users to specify and generate test cases and oracles in a declarative way. Extended from its previous grammar-based test generation tool, *TAO* provides a declarative notation for defining *denotational semantics* on each productive grammar rule, such that when a test case is generated automatically, its expected semantics will be evaluated as well, serving as its test oracle. *TAO* further provides a simple tagging mechanism to embed oracles into test cases for bridging the automation between test case generation and software testing. Two practical case studies are used to illustrate how automated oracle generation can be effectively integrated with grammar-based test generation in different testing scenarios: locating fault-inducing input patterns on Java applications; and Selenium-based automated web testing.

Keywords: Software testing, test case generation, test oracle, denotational semantics

1. Introduction

With the increasing dependence on software by all sectors of industry, critical software failures can have significant impact on safety and have economic and legal ramifications. Software testing takes up a significant portion

[☆]The manuscript is an extended version of the author's QSIC'14 paper [1].
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