

Designing a Test Set for Structural Testing in Automatic Programming Assessment

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Abstract

An automatic programming assessment (APA) method aims to support marking and grading of students' programming exercises. APA requires a test data generation to perform a dynamic testing on students' programs. In software testing field, diverse automated methods for test data generation are proposed. Unfortunately, APA seldom adopts these methods. Merely limited studies have attempted to integrate APA and test data generation to include more useful features and to provide a precise and thorough quality of program testing coverage. Thus, we propose a test data generation approach to cover both the functional and structural testing of a program for APA by focusing the structural testing in this paper. We design a test set based on the integration of positive and negative testing criteria that enhanced path coverage criterion to select the desired test data. It supports lecturers of programming courses to furnish an adequate set of test data to assess students' programming solutions in term of structural testing without necessarily having the expertise in a particular knowledge of test cases. The findings from the experiment depict that the test set improves the criteria of reliability and validity for test data adequacy in programming assessments.

Keywords : Automatic Programming Assessment (APA), test data generation, structural testing, path coverage, positive testing, negative testing