Teaching Software Testing Methods Based on Diversity Principles

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Abstract

Software testing is the primary approach to support software quality assurance. Many novel software testing methods have been proposed to achieve various tasks in recent years. It is a challenge to teach these new testing methods and classical testing methods within limited time. This paper reports our work in progress on the new teaching approach to software testing methods based on diversity principles.

1. Introduction

Software testing is an essential and key activity in the lifecycle of software development. Software testing remains the primary way to support software quality assurance, despite some alternative approaches, such as code inspection, formal verification, etc., can also be used. Software testing has been widely adopted in industry. Nowadays software quality becomes the dominant success criterion in the software industry. In the past decades, a lot of advanced techniques, automation tools, and effective processes of software testing have been proposed and developed by researchers and practitioners. Apart from these achievements, the testers’ skill, enthusiasm and commitment still play key roles in a successful test process [1]. Therefore, software testing becomes an essential and important subject in the teaching program of software engineering [2].

As claimed by A. Bertolino in [1], “Education must be continuing, to keep the pace with the advances in testing technology”. Many advanced software testing methods, such as adaptive random testing [3], cluster test selection [4], similarity-based test selection [5], etc. have been proposed in recent years. Although these new testing methods are proposed to achieve various targets, they share a common characteristic: diversity of test cases. Actually, diversity is not a new idea in software testing. It is implicit in many traditional testing methods, such as domain testing [6], coverage testing [7], combination testing [8], etc. It is necessary, interesting and challenging to teach various software testing methods based on diversity principles. This paper reports our work in progress on the new teaching approach to diversity principles in software testing.

2. Challenge and solution

The “Software Testing and Quality” is a core curriculum for undergraduate students in Software Institute of Nanjing University. The “Software Testing and Quality” focuses on teaching various software testing methods and their applications in practice. The duration of the curriculum is only 12 weeks and 3 hours per week. For the curriculum as for other related software testing curricula [9], it must be carefully designed so that students could gain an in-depth understanding of various software testing methods and skillfully use these methods in practice. Many software testing methods, both practical and theoretical ones, will be taught in...