Test Case Reduction Approach in User Session Based Testing for Web Application

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Abstract

Web application testing is crucial to provide reliable services for the fast growing demand on web application. Testing, designing and generating test cases are challenging task because web application is complex and changeable. Among test case generation, user session based test case generation has been researched to generate test cases by the use of user session data. In user-session based testing, a tester captures user accesses during deployment to create user session, which are then replayed as test cases. This paper describes the test case reduction approach for analyzing, and replaying the large number of test cases generated from user session data. Entropy gain theory is used to generate user session based test cases. Moreover, this system combines the user session data with the internal structure analysis of the application for ensuring the reliability of web application. The rate of fault detection of the test suite is measured to evaluate the effectiveness of proposed system.

Keywords: user session based testing, entropy measure, web application testing

1. Introduction

Web applications have been dramatically increased and most daily activities rely on the services provided by them. The qualities of these applications are central role because it may be great impact on daily activities. Efficient and effective testing of web application is crucial for reliable services. Furthermore, the nature of web applications are frequently changed and upgraded due to security attacks and user preference changes. Web application testing is to uncover the content errors, navigation error, and compatibility issues etc. Testing must be performed completely in time without service interruption. User session data has been recently used to create test cases. For web application system, field data has the additional advantage because the usage data is independent of the underlying implementation and server technologies [4]. User session based testing is an automated approach to enhance an initial test suite with real user data. The logged user sessions are collected as a set of use case which is behaviorally related events accessed by user through the system. In user session based testing, test suite reduction is main considerable point of executing the test sequences that are not only smaller in size but also equivalence in effectiveness to an original test suites. A major problem with user session based testing is the cost of collecting, analyzing, and replaying the large number of test cases generated from user session data [7]. Automated cost-effective test strategies are needed to provide reliable, secure and usable web application. Given a set of user sessions, there are techniques of producing test data for web applications [2, 3]. The main points of user session based testing are the selection and reduction methods of test case suites. This paper describes the test case reduction approach by applying entropy gain theory and analyzing the internal structure of web application. This approach requires white box analysis phase that determine the structure of web application. The dependent pages are extracted from web application structure and sorted by time stamp from log data. The highest entropy gain of user session is selected as a test case and then dependent links that are accessed by the user are considered as a test case to cover the overall web application structure. The related work is described in section 2. In section 3, this paper describes the web applications, user session based testing and test case generation. Section 4 discusses the proposed system and the metric for evaluating the testing effectiveness. The paper is concluded in section 5.

2. Related Work

Elbaum et al. [2] studied several techniques for using user session data gathered as users operate Web applications to help test those applications from a functional standpoint. The studies showed user session data can be used to produce test suites more