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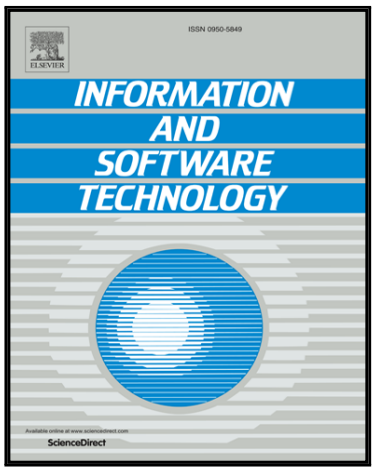

Test case prioritization approaches in regression testing: A systematic literature review

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ACCEPTED MANUSCRIPT

Test case prioritization approaches in regression testing: A systematic literature review

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Abstract

Context: Software quality can be assured by going through software testing process. However, software testing phase is an expensive process as it consumes a longer time. By scheduling test cases execution order through a prioritization approach, software testing efficiency can be improved especially during regression testing.

Objective: It is a notable step to be taken in constructing important software testing environment so that a system's commercial value can increase. The main idea of this review is to examine and classify the current test case prioritization approaches based on the articulated research questions.

Method: Set of search keywords with appropriate repositories were utilized to extract most important studies that fulfill all the criteria defined and classified under journal, conference paper, symposiums and workshops categories. 69 primary studies were nominated from the review strategy.

Results: There were 40 journal articles, 21 conference papers, three workshop articles, and five symposium articles collected from the primary studies. As for the result, it can be said that TCP approaches are still broadly open for improvements. Each approach in TCP has specified potential values, advantages, and limitation. Additionally, we found that variations in the starting point of TCP process among the approaches provide a different timeline and benefit to project manager to choose which approaches suite with the project schedule and available resources.

Conclusion: Test case prioritization has already been considerably discussed in the software testing domain. However, it is commonly learned that there are quite a number of existing prioritization techniques that can still be improved especially in data used and execution process for each approach.

Keyword: Test case prioritization; Regression testing; Software testing; Systematic literature review

1. Introduction

Software engineering is not just programming and software development. Software engineering itself is an implementation of engineering procedures in the development of any software in a systematic way [1]. Within a software development process, software testing consumes a longer time in execution and can be the most expensive phase [2]. Software testing itself is normally, repetitively, carried out even when there are time constraint and fixed resources. Software engineering groups are regularly compelled to end their testing activities because of financial and time necessities, which will trigger some difficulties such as problems with the software quality and client agreement. However, the application of test case prioritization (TCP) appears to enhance test viability in software testing activity [3].

Regression testing is an activity to confirm that progressions do not harm the previously functioning software [4], [5]. As the software evolves, a software test suite has the tendency to increase in size which frequently makes it expensive to execute. Research shows regression testing is an expensive process which may require more than 33% of the cumulative expenses of the software [6]. In the work of Yoo and Harman [7], various regression test approaches were examined to supplement the importance of the accumulated test suite in

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